ANNOUNCEMENTS 1969-70

CALUMET
Campus

PURDUE UNIVERSITY BULLETIN

University Calendar

1969

SEPTEMBER

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1970

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First Semester

September 10
Classes begin
November 25
Thanksgiving vacation begins
December 1
Thanksgiving vacation ends
December 20
Christmas vacation begins
January 5
Classes resume
January 10
Classes end
January 13
Final examinations begin
January 20
Semester ends

Second Semester

February 2
Classes begin
March 21
Spring vacation begins
March 30
Classes resume
May 23
Classes end
May 26
Final examinations begin
June 2
Second semester ends
June 7
Commencement

Summer Session, 1970

June 15-August 7
Regular 8-week session
No classes held on July 4

PURDUE UNIVERSITY BULLETIN

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Calumet Campus

Announcements for the Year 1969-70

PURDUE UNIVERSITY

PUBLISHED BY THE UNIVERSITY
LAFAYETTE, INDIANA

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PURDUE UNIVERSITY

Division of Regional Campuses

Lafayette, Indiana

OFFICERS OF ADMINISTRATION AND INSTRUCTION

Administrative Officers

Frederick L. Hovde, B.Ch.E., M.A., D.Sc., LL.D., D.Eng., D.H.L., D.C.L., Pd.D.	President
Lytle J. Freehafer, A.B.	Vice President and Treasurer
George A. Hawkins, Ph.D.	Vice President for Academic Affairs
Frederick N. Andrews, Ph.D., D.Sc.	Vice President for Research and Dean of the Graduate School
Donald R. Mallett, Ph.D.	Vice President for Student Services
C. H. Lawshe, Ph.D.	Vice President for Regional Campus Administration

Regional Campus Administration

G. Walter Bergren, M.S.M.E.	Administrative Dean for Academic Affairs
L. O. Nelson, Ph.D.	Administrative Dean for Student Services
N. M. Parkhurst, M.S.	Registrar
D. A. Scott, Ph.D.	Administrative Dean for Development and Planning
J. E. Thatcher, B.S.B.A.	Director of Business Administrators
H. W. White, M.S.	Director of Admissions

Calumet Campus Administrative Staff (Hammond)

Carl H. Elliott, Ph.D.	Dean and Director
Richard J. Combs, A.M.	Associate Dean
Larry M. Crawford, M.S.	Registration Officer
Melvin D. DeGraff, M.S.	Assistant Dean for Student Services
John Fruth, M.S.	Admissions Officer
Bernard H. Holicky, M.S.L.S.	Librarian
Harry H. Hubbard, M.S.	Assistant Director for Administration
Boyd R. Mangus, M.S.	Manager, Calumet Extension District
Gary Newsom, B.S.	Business Administrator
Leonard L. Perkins, M.A.	Student Affairs Officer
Alfred D. Sander, Ph.D.	Assistant Dean for Academic Affairs
William F. Sheahan, B.A.	Financial Aids and Placement Officer

General Information

Centennial year, 1969, marks 100 years of growth and progress for Purdue University. From an institution of six instructors and 39 students, Purdue, Indiana's land-grant college, has grown to a major university with a faculty of 2,100 and a student body of more than 34,000 on five campuses.

Purdue has established, largely since World War II, a series of regional campuses for the purpose of offering educational opportunities in the major population areas of Indiana. The Calumet Campus, the largest of the regional campuses, primarily serves the communities located in the northwestern part of the state. This area—the industrial heartland of the midwest—is adjacent to metropolitan Chicago and is situated in the southeastern section of Hammond, just off the Tri-State Expressway and Indianapolis Boulevard.

HISTORY

Purdue University has been a part of the Calumet region's educational community for some 28 years, growing with the educational needs of the area and the nation. Purdue Calumet's operation began in what was almost a casual fashion, as extension classes, short term projects, and other special events, taking advantage of already existing physical facilities in the area.

The first major change came in 1943, when the pressures of production for World War II rapidly increased the needs of the area's industries for skilled craftsmen and technicians. A series of technological programs were instituted under the War Manpower Training Act, in which Purdue, as a land grant college, participated.

By 1948, University administrators and other community leaders were certain that the rapid growth of higher education was to be a permanent feature of the nation's life, and so purchased, in part with money contributed by Calumet area businessmen and individuals, land totaling about 167 acres, bounded by the Calumet Expressway, 169th Street, Woodmar Avenue, and a line running variously from Wicker Avenue to the New York Central tracks. In 1951 Purdue moved into the first building on its permanent site. In 1954, the Industrial Research Institute building was completed. The funds for these buildings came, for the most part, from the University's Ross-Ade Foundation. A small parcel of land was transferred to the State of Indiana for the building of the National Guard Armory, which was also to provide physical training facilities for Purdue students. A $2,500,000 addition to the original campus building was opened for use in 1963. In late 1968 a Technology Building and a Central Power Plant were added and in 1969 construction started on a

Library and Student-Faculty Center and an Electrical Engineering Building —all part of a master plan for total campus development of the original 1948 purchase to meet the growing educational needs of the Calumet region. The present air-conditioned physical facilities—including an ever-growing library, modern laboratories and lecture halls, spacious classrooms, well-appointed lounges and study halls, and closed-circuit television facilities—form but part of a rapidly expanding campus. Indeed, growth in student body and in breadth of offerings will make almost continuous building a necessity for the next several years, adding still further chapters to the University's history of service to the citizens of the community.

PURPOSE AND FUNCTION

The Purdue University Calumet Campus espouses the spirit of the land grant university tradition and is especially dedicated to the service of the people of northwest Indiana within the charter given to Purdue University. At this time its primary mission is threefold: to provide its students with a liberal education that will prepare them for life or the professions; to provide career-oriented studies that lead to certificates, associate degrees, and baccalaureate degrees; and to provide programs that meet the professional, cultural, and general educational needs of the community.

To fulfill this mission the Board of Trustees has authorized the Calumet Campus to institute, when needed, any of the undergraduate programs traditionally a part of Purdue's programs. Under this grant of authority the Calumet Campus held its first commencement in June 1967.

Within its goal of providing a liberal education and preparing students for professional education the Calumet Campus offers baccalaureate programs in English, history, mathematics, chemistry, German, political science, speech, and psychology. Baccalaureate programs which are more career related would include elementary and secondary education teaching, construction technology, manufacturing technology, supervision technology, and electrical technology. To provide for the professional, cultural, and general education needs of the community, the campus regularly offers various types of continuing education, dramatic performances, and concerts, as well as graduate programs offered in conjunction with the Lafayette campus.

In accordance with a long-standing policy of the Board of Trustees, all educational services and programs of the University are available and open to all academically qualified individuals without any discrimination whatsoever with respect to race, creed, or national origin.

ORGANIZATION

Purdue Calumet functions as an integral part of Purdue University. Faculty members, numbering over 150 full time, and ranking from instructor to professor, hold their appointments in University-wide departments, achieve advancement through a University-wide promotion mechanism, and teach courses as part of University-wide curricula established by the various schools within the University. Course numbers and content are the same for all campuses of the University. Diplomas are awarded by "Purdue University, at Hammond, Indiana."

PROGRAMS

In providing studies in the liberal arts and sciences, Purdue Calumet offers curricula in the School of Humanities, Social Science, and Education; in the School of Science; and in the School of Pharmacy and Pharmacal Sciences. In providing career-oriented studies Purdue Calumet offers curricula in the schools of Agriculture, Engineering, Home Economics, Industrial Management, and Technology. The present stage of program development is as follows:

Course Offerings and Degrees Available at PUCC
1969-70 Academic Year

MAJOR	2 Years	3 Years	Bachelor's Degree*	Graduate Level Courses	Complete Master's Degree	Master's Degree with 1 summer at Lafayette
AGRICULTURE						
Forestry	X					
Pre-Vet. Science	X					
All Others	X					
ENGINEERING		X			X	
HOME ECONOMICS	X			X		
HUMANITIES, SOC. SCI. AND EDUCATION						
American Literature			X		X	
Education						X
Elem. Education			X			X
English Literature			X		X	
English Teaching			X			X
American History			X			X
European History			X			X
Library Science	X					X
Modern Languages						
French Spanish Russian		X				
German			X	X		
P.E. for Men	X					
Political Science			X	X		
Psychology			X	X		
Speech			X	X		
Soc. Studies Teaching			X			
Sociology		X		X		
All Others	X					
IND. MANAGEMENT						
Economics			X	X		
Industrial Mgt		X				

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* Minors and teaching minors available in all areas.

MAJOR	2 Years	3 Years	Bachelor's Degree*	Graduate Level Courses	Complete Master's Degree	Master's Degree with 1 summer at Lafayette
SCIENCE						
Biology	X			X		
Chemistry			X			
Chemistry Teaching			X			
Math			X			
Math Teaching			X		X	
Physics		X		X		
Pre-Medicine	X					
Pre-Pharmacy	X					
Med. Technology	X					
All Others	X					
TECHNOLOGY						
Industrial Supervision			X			
Industrial Arts Ed. 1 Year						
Technical Teaching		X				
Voc. Ind. Teaching		X				
Construction Tech.			X			
Electrical Technology			X			
Mechanical Technology			X			
Supervision Technology			X			

SCHOOL OF TECHNOLOGY

Associate Degrees (2 years)

- Architectural Technology
- Chemical Technology
- Civil Engineering Technology
- Computer Technology (Commercial and Technical Options)
- Electrical Engineering Technology
- Food Service Technology
- Industrial Engineering Technology
- Mechanical Engineering Technology
- Metallurgical Engineering Technology
- Nursing (leading to RN Degree)

For more information write or call the Office of Admissions

Admission

GENERAL UNDERGRADUATE REQUIREMENTS

All persons wanting to take advantage of the opportunity for higher education at the Calumet Campus of Purdue University must file an application for admission. Requests for information and application forms should be addressed to the Office of Admissions, Purdue University Calumet Campus, 2233 171st St., Hammond, Indiana 46323. Students pursuing the baccalaureate degree, associate degree, and credit certificate programs must be high school graduates. A prospective student should complete the application according to instructions and then forward the form to the high school from which he is to be or already has been graduated. The high school should then complete the application and return it to the Office of Admissions at the Calumet Campus. High school students should make application during their seventh semester of high school, or as soon as possible thereafter. High school graduates should make application immediately. This enables the University to fully evaluate an applicant's eligibility for consideration and to notify the applicant at an early date of the action taken, thus allowing the applicant to complete his educational plans.

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* Minors and teaching minors available in all areas.

An individual's eligibility for consideration will depend upon many factors, among which are: 1) subject matter requirements for the school or program to which he is applying; 2) high school class standing; 3) College Entrance Examination Board SAT results; 4) high school comments and recommendations; 5) previous college work, if any; and 6) other personal information.

1. Subject Matter Requirements—The following table shows the minimal requirements for each school within tthe University.

Curricula	High School Graduation	1 Unit Algebra	½ Unit Advanced Algebra	1 Unit Plane Geometry	½ Unit Trigonometry	1 Unit Laboratory Science	3 Units English	1 Unit Social Studies	Total of Not Less Than 15 Units
Agriculture and Forestry	X	X		X		X	X	X	X
Engineering	X	X	X	X	X	X	X	X	X
Home Economics	X	X		X		X	X	X	X
Physical Education (Men)	X					X	X	X	X
Science	X	X	X	X	X	X	X	X	X
Humanities, Social Science, and Education	X	X		X		X	X	X	X
Industrial Management	X	X	X	X	X	X	X	X	X
Industrial Education	X	X		X		X	X	X	X
Technology 2 years	X	X		X		X	X	X	X
Technology, B.S.	Two-year associate degree								
Pharmacy	One year of prepharmacy in School of Science								
Veterinary Science and Medicine	Two years of preveterinary in School of Agriculture								

Although meeting the minimum subject matter requirements may qualify a student for consideration for admission, it may not qualify him to meet the competition of his classmates. Individuals with one required subject deficiency in their high school background may be eligible for admission if they rank in the top one-third of their high school graduating class and are otherwise well qualified.

High school students who desire to study engineering, mathematics, chemistry, or physics should establish credit in the following high school subjects in addition to the minimum requirements in order to graduate in eight semesters: a fourth semester of algebra and a full year of both physics and chemistry.

2. High School Class Standing (Indiana residents)—Preference is given to applicants in the upper half of their high school graduating class. Applicants who rank in the lower half but *above* the lowest third (33rd percentile to 50th percentile) may be given consideration for admission if additional factors indicate that they have a reasonable chance for success at Purdue.
3. College Entrance Examination Board (CEEB) tests—All applicants who have not recently completed a full year of college study are required to submit their results on the Scholastic Aptitude Test (SAT) and achievement tests in English, mathematics, and chemistry (students who have not had chemistry may substitute physics or biology). High school students should take the SAT in December (November for Indiana residents) and the achievement tests in the spring of their senior year. Complete information concerning CEEB testing is available at most high schools, or persons may write directly to: College Entrance Examination Board, Box 592. Princeton, New Jersey 08540. High school graduates who do not file their application in time to arrange for the required tests should contact the Office of Admissions immediately.

On the basis of the factors considered, action on the individual's application may be one of the following:

1. granted unqualified regular admission—this means that the applicant has met all entrance standards and requirements for admission.
2. admitted unclassified (on probation)—this applies to the applicant whose academic background and preparation does not meet the entrance standards and/or requirements, but who the university feels has a reasonable chance of gaining regular admission at a later date.
3. admission denied or postponed until an adequate academic background and preparation can be demonstrated.

Any admission to the University is provisional pending the receipt of all required student information. The University reserves the right to cancel any admission if a student fails to provide all necessary credentials.

NONRESIDENT ADMISSION

Out-of-state applicants must complete the same general requirements as Indiana residents. In addition, nonresident applicants should rank in the highest quarter of their high school graduating class or in the highest quarter of the College Entrance Examination Board SAT test in order to be eligible for consideration. Students who are not in the highest quarter but that are in the upper half of their class (50th percentile to 75th percentile) may be given consideration. Nonresident transfer students must have a "B" average in all previous college work (see "Transfer Students" below).

TRANSFER STUDENTS

An applicant transferring from another college or university must fulfill the following requirements in order to be considered for admission:

1. submit an application for admission on the prescribed form through the high school from which he was graduated, including the College Entrance Examination Board test results.
2. forward an official transcript of work done in institutions previously attended to the Office of Admissions at the Calumet Regional Campus.
3. Indiana Residents only—Have a "C" average in all work done in institutions previously attended. Persons who do not have a "C" average but show academic potential may be given consideration.
4. Nonresidents only—Have a "B" average in all previous college work.

Credit earned at other institutions with the grade of "C" and above will be evaluated in terms of how it fulfills the graduation requirements at Purdue University. Evaluation of credit is completed after a student is admitted to the University.

TEMPORARY STUDENTS (NONDEGREE)

Persons who desire to take advantage of the instruction in any of the departments of the University without undertaking one of the regular plans of study and without becoming a candidate for a degree may be admitted as temporary students. Such students must present evidence that they are prepared to undertake the work desired and must progress satisfactorily in their work.

Admission as a temporary student is for one semester only and any further enrollment must be approved by the Office of Admissions. A maximum of 11 credit hours may be taken in any one semester and a maximum of 24 credit hours may be accumulated while classified as a temporary student.

A personal interview is required with a member of the Office of Admissions staff prior to admission as a temporary student. Any student who is registered in another college or university and wishes to attend Purdue during the same semester must submit a letter from the other institution approving the specific courses to be taken at the Calumet Campus. All students who have been previously enrolled in another institution must have a letter of good scholastic and social standing on file with the Office of Admissions prior to enrollment. Application for admission as a temporary student should be made to the Office of Admissions at the Calumet Campus.

RE-ENTRY STUDENTS

A person in good standing who formerly has attended any Purdue campus, but has not been in attendance for one semester or more, must file an application fo re-entry at the Registration Office at least three weeks prior to registration for any given semester. Each individual situation will determine the status of the person's eligibility for re-entry. If eligible, he will receive an "Authorization of Enrollment" notifying him of his acceptance.

A re-entry form cannot be used by a person who has been formally dropped by the University. In such a situation he should apply for re-admission through the Office of Student Affairs and Guidance.

RE-ADMISSION OF STUDENTS

Any person who has been formally dropped from the University for academic reasons and wishes to re-enter must make application for re-admission to the Faculty Committee on Scholastic Delinquencies and Admissions. Forms for initiating this procedure are available through the Office of Student Affairs and Guidance at the Calumet Campus.

ADVANCED CREDIT

The University is anxious to give recognition in the form of advanced standing and credit to students who have successfully completed college level work in their high schools. There are two basic ways in which credit may be established:

1. College Board Advanced Placement Tests—Students with advanced training in a particular subject area should take the appropriate examination and have the results forwarded to Purdue.
2. Purdue Advanced Credit Examinations—A number of students may be invited to take special examinations in various subject matter areas as determined by evidence of competency in CEEB testing and high school work.

Advanced standing and credit should not be confused with placement. Placement involves having students start at the correct level of a course within the freshman sequence. High school record and College Board SAT and Achievement test results are employed in making these placements. Placement involves no advance credit.

AUDITING CLASSES

Courses may be audited. No grades or credits are received. Attendance in class is permissible when the regular class fees are paid and the individual has declared himself as an auditor.

Registration

ADVANCED REGISTRATION

Current students should preregister for fall, spring, and summer sessions at announced times. New students should preregister at the times specified by the registration officer. Advanced registration eliminates standing in line and assures preferential scheduling.

DELAYED REGISTRATION

For students who are unable to preregister, a three-day registration period is held just prior to the beginning of classes. Consult the current semester schedule for dates and times.

LATE REGISTRATION

Late registration lasts one week from the first day of classes. Late registration fees are explained on page 16.

DROPPING AND ADDING COURSES

A student may add a course to his schedule only during the first week of classes (first three days of summer school). In order to effect a withdrawal from any class, a student must notify his academic advisor at the time of withdrawal, and students who do not notify the office when they plan to withdraw will be given a failing grade in each course involved. To drop a course, consult the fee refund schedule on pages 18 and 19 and the directed grades explanation on page 20.

TRANSFER OF ENROLLMENT TO THE LAFAYETTE CAMPUS

Upon the completion of any semester or summer session a regularly admitted student may transfer his enrollment from the Calumet Campus to the Lafayette Campus. To initiate this process the student must report to the registration officer and complete the necessary forms. Following this procedure he will receive an "Authorization for Enollment" form from the Lafayette Campus along with instructions for registration. Transfer students must return the student health form to the Health Center before registering at the Lafayette Campus. Only students attending on regular status may transfer to the Lafayette Campus.

A student who is regularly enrolled at the Lafayette Campus for the academic year, but is attending summer classes at the Calumet Campus, does not need to file a Transfer of Enrollment form to continue at the Lafayette campus for the following academic year.

Student Services

GENERAL COUNSELING

The student affairs and guidance office is the counterpart of several Lafayette campus agencies which are charged with the responsibility of assisting and encouraging students in many out-of-classroom aspects of their college life. It maintains close ties and coordinates policy with appropriate University officials at the Lafayette campus in order to insure that all Purdue students, regardless of their location, will receive the rights and privileges to which they are entitled, and to make certain that they will be aware of and carry out the responsibilities they assumed as a condition of their admission to Purdue.

Personnel in the office are available for consultation about any matters of personal or general concern. Assistance is available in such matters as financial aid, job placement, campus activities, housing, and part-time employment. Lafayette Campus agencies which may be utilized for specialized assistance include the Psychological Services Center, the Speech and Hearing Clinic, and the Measurement and Research Center for interest, aptitude, and vocational testing. School advisers are assigned to assist each student to work out a program of study that will include all required courses and a wise choice of electives. The Student Affairs and Guidance Office coordinates its activity with academic counselors to insure that student advisement includes all aspects of college life.

FINANCIAL AID

Scholarships and Loans

No student may be considered for financial assistance until he has been admitted to the University. However, applications may be secured, completed, and forwarded to the Financial Aids Officer prior to notification of acceptance so that the financial need may be analyzed. High school students who plan to attend Purdue should apply for admission early in the senior year and arrange to take the appropriate College Entrance Examinations Board Tests in December of that year to insure early consideration of their requests for financial aid.

Transfer students and readmitted students who are in need of financial aid should also file their requests for aid as early as possible.

Students should make clear when filling in the application for financial aid that they plan to attend the Calumet Campus. Most scholarship applicants will be notified of the action on their applications before their graduation from high school.

Aid for Current Students

Financial aid in the form of scholarships and loans is available for students already enrolled at the Calumet Campus. Further information may be obtained by contacting the Student Affairs and Guidance Office.

ORIENTATION

All entering freshmen carrying an academic load of 12 hours or more are required to attend the orientation program scheduled before classes begin in the fall semester. At these sessions new students become familiar with the history and traditions of the school and are informed about rules, regulations, and administrative procedures pertaining to the college. An opportunity to become acquainted with the faculty and upperclassmen is offered at this time.

AUTOMOBILE REGISTRATION

Because the Calumet Campus is essentially a commuter college, any registered student may use the parking facilities supplied by the University. All students are required, however, to register each vehicle they intend to drive on University property with the Office of Safety and Security, to pay the appropriate fee, and to display the stickers which are issued. Strict observance of the regulations governing the registration of vehicles and the use of parking facilities is required to avoid congestion.

INSURANCE

Low cost University accident and health insurance similar to the policy offered at the Lafayette campus is offered annually to all students carrying an academic load of 8 hours or more. Students may take advantage of the opportunity at the beginning of each semester.

PLACEMENT

The Calumet Campus offers a placement service for its graduates as do the placement services on the Lafayette Campus. Prospective employers are encouraged to interview students at the campus prior to graduation. Undergraduates are assisted in finding part-time work and summer employment which brings needed revenue and often provides valuable experience. Vocational career conferences are arranged and occupational information is available at the Student Affairs Office. Alumni seeking other and better positions may also avail themselves of the placement services.

STUDENT ACTIVITIES

Purdue encourages its students to participate in student activities in the belief that membership in an organization not only provides a broader educational base for the individual, but also adds wider experience to his personal assets. Many students find an opportunity to convert classroom theory into practical use in this manner. More than twenty clubs and organizations are active on the Calumet Campus. They include a student senate, a newspaper, service organizations, and many special interest groups, as well as fraternities and sororities. The clubs are generally self directed and draw on the faculty for sponsorship and advice. Any registered student who has paid the activity fee is eligible to participate in the activity program.

RESERVE OFFICER TRAINING CORPS

Male students planning to transfer to the Lafayette Campus are now eligible for a new two year Advanced ROTC Program leading to a commission in the Air Force, Army or Navy. The program is available to anyone having four full academic semesters remaining on the Lafayette campus, including graduate school. Those students desiring further information should contact the Office of Student Affairs.

ATHLETICS

In addition to the regularly scheduled physical education classes for men and women, a program of intramural sports is offered to Calumet Campus students. Varsity teams of baseball, basketball, and golf have been organized, and they play scheduled games against other teams in the area. Clubs are added to the roster of student activities as student interest is expressed.

DIVISION OF CONFERENCES AND CONTINUATION SERVICES

The Office of Continuing Education provides an expanding program of conferences and special courses designed to serve the educational needs of Northwest Indiana.

The professional community participates in refresher courses designed to up-date knowledge and experience in specific areas. The educational community is served with workshops and courses not yet included in the Calumet Campus semester schedule.

Special adult education programs designed to meet individual interests are offered as the community needs are known.

University Fees

Fees are subject to change by the Board of Trustees without notice. All fees are payable at the time of registration each semester.

SCHEDULE OF FEES

Resident undergraduate	$20	per credit hour
Non-resident undergraduate	40	per credit hour
Resident Graduate	25	per credit hour
Non-resident graduate	50	per credit hour
Laboratory fees	5	per lab hour
Registration for examination only	25	
Registration for degree only	25	

Estimated basic costs for two semesters for full time undergraduate students:

	Indiana Residents	Nonresidents
University fees	$700	$1450
Books and supplies	100	100
Total	$800	$1550

This total does not include the cost of transportation, housing, and meals.

Late Registration Fees. After classes begin a late registration fee will be assessed each registration at the rate of $5 per course and a $10 maximum always to apply.

Activity Fees. Undergraduate students enrolled in 9 semester hours or more pay an activity fee of $10 per semester. This fee is optional for undergraduate students enrolled for fewer than 9 hours and for all graduate students.

Athletic Fees. Undergraduate students enrolled in 9 semester hours or more pay an Intercollegiate and Intramural Athletic Fee of $5 per semester. This fee is optional for undergraduate students enrolled for fewer than 9 hours and for all graduate students.

Breakage Fees. Course fees include the cost of normal breakage and wear and tear on equipment. An additional charge will be levied against individuals for excessive waste, loss, or breakage that may occur. Such special charges must be paid before course credit will be given.

Parking Fees. Parking fees are based on the number of credit hours that a student originally registers for. The following schedule will prevail:

	Cost per semester	
	"A" Space	*"B" Space*
Students enrolled in 9 or more hours	$30.00	$12.50
Students enrolled in 8 hours or less	15.00	6.25

CLASSIFICATION OF STUDENTS FOR TUITION PURPOSES

1. *General.* This regulation establishes the principles and procedures by which students shall be classified for tuition purposes at all campuses of Purdue University. Those classified as non-resident students are required to pay a tuition-fee in addition to the regular fees.

2. *Domicile.* As used herein, "domicile" means a person's true fixed and permanent home and place of habitation. The determination of a person's domicile involves a consideration of all relevant factors. Neither the ownership of property in Indiana, employment in Indiana, the payment of taxes, licenses, or other fees in Indiana, nor the registration as a voter in Indiana will necessarily be controlling in determining whether a person has established a domicile in Indiana for the purpose of this regulation.

3. *Married Students.* This regulation applies to married students as well as unmarried students. The marriage of a student is an additional factor to be considered in determining domicile for the purposes of this regulation. The domicile of a married woman shall be presumed to be that of her husband.

4. *Resident Students.* Resident students are not required to pay tuition. Resident students include the following:

   (a) Students who are either 21 years of age or older or are emancipated and who have been domiciled in Indiana for at least six consecutive months immediately preceding the beginning date of the first session of attendance as either a beginning or re-entry student;

   (b) Unemancipated minor students whose parents, legal guardian, or other person having legal custody, have been domiciled in Indiana for at least six consecutive months immediately preceding the beginning date of the first session of attendance as either a beginning or re-entry student;

   (c) The spouse of a staff member so long as such staff member is eligible to pay staff fees;

   (d) Alien students lawfully admitted to the United States for permanent residence and who are otherwise eligible for classification as resident students; and

   (e) Such other students as the president of Purdue University may approve for classification as resident students in unusual circumstances, consistent with general policies herein established.

5. *Non-Resident Students.* All students not classified as resident students shall be required to pay tuition and shall be classified as non-resident students.

6. *Application for Change in Classification.* The initial classification of a student for tuition purposes shall continue in effect for all subsequent semesters unless and until such classification is changed. Changes may be initiated by the registrar or applied for by the student and approved by the registrar. No change shall be effective as to any semester unless it is made or approved by the registrar within 60 days after the day on which classes begin for that semester. The registrar shall not approve any application by a student for a change in tuition classification unless such application is made in writing on a form approved by the registrar, and is filed with the registrar on or before

15 days after the day on which classes begin for the semester for which the change is requested.

7. *Change from Non-Resident to Resident Status.* A non-resident student may be reclassified, upon application, as a resident student, if;

(a) He is an unmarried minor or is unmarried and over 21 years of age and is and always has been dependent upon his guardian or parent and if his legally responsible parent or guardian has moved into the State of Indiana and has maintained a domicile in the state for six consecutive months.

(b) He becomes emancipated from his parents and providing he has maintained his domicile in the State of Indiana for not less than six consecutive months during which time he has provided his sole support through income which he has earned in the State of Indiana.

(c) He is a married student who, together with his spouse, is entirely dependent upon their own income; and providing such income is earned by them in the State of Indiana; and providing they have supported themselves and maintained their domicile in the state for a period of six consecutive months.

8. *Change from Resident to Non-Resident Status.* A resident student will be reclassified by the registrar to non-resident status if;

(a) He is an unmarried minor and his legally responsible parent or guardian has moved outside the State of Indiana and has maintained a domicile outside the state for six consecutive months.

(b) He is the spouse of a non-resident student no longer eligible to pay staff fees.

9. *Responsibility for Tuition Classification.*

(a) The director of admissions shall determine the tuition classification of each undergraduate student as of the time he enters the University.

(b) The Registrar shall determine the tuition classification of each graduate student and each re-entering student.

(c) Any change of tuition classification of a student after initial registration shall be subject to the approval of the registrar.

(d) The classification of any student for tuition purposes may, on request of the student, be appealed to a Review Committee to be appointed by the president of the University. The decision of the Review Committee shall be final and binding upon the University and the student.

10. *Miscellaneous.*

(a) The director of admissions, the registrar, and the Review Committee are authorized to require such certificates, affidavits, documents, or other evidence as they deem necessary in the determination of facts relating to the classification of students for tuition purposes.

(b) The misrepresentation of material facts or the failure to disclose material facts by any student, prospective student, or other person, in connection with tuition classification shall be grounds for the suspension or dismissal of the student in question.

Diploma Fees. Bachelor's and master's degree, $10; Ph.D. degree, $15; payable before noon on the Friday preceding graduation or earlier by special announcement.

Candidates for Associate's degree, $10 payable not less than 30 days before the close of the semester in which they expect to complete the degree requirements.

Refunds. Course fees (to include regular student fee, laboratory fee, and nonresident fee) will be refunded under any one of the following conditions:

1. Withdrawal during first week of semester, 100 percent refund.
2. Withdrawal during second week of semester, 60 percent refund.
3. Withdrawal during third week of semester, 40 percent refund.
4. Withdrawal during fourth week of semester, 20 percent refund.
5. Withdrawal after fourth week of semester, no refund.

Deposits on equipment are subject to regular service and breakage charges.

Refunds are not transferable from one registration period to another or from one student to another. The same schedule will be applied to Listeners, Visitors, and Auditors fees.

To be eligible for a refund, the student must notify in person his academic advisor and complete the necessary withdrawal procedures.

Service Fee. Students requesting duplicate copies of their schedule-receipt forms, etc., must pay a service fee of $1. Replacement copy of permanent I.D. card will be $2.

Withdrawal. In order to effect a withdrawal from any class, a student must notify his academic advisor at the time of withdrawal. Discontinuance of class attendance is not the basis for withdrawal, and students who do not notify the office when they plan to withdraw will be given a failing grade in each course involved.

Grading

ASSIGNING OF GRADES

INSTRUCTORS WILL ASSIGN each student a grade for each course in which he is enrolled at the close of a session. The student shall be responsible for the completion of all required work by the time of the last scheduled meeting in the course unless his assignment to the course has been properly cancelled. The grade shall indicate the student's achievement with respect to the objectives of the course.

For credit courses:

A—highest passing grade.
B
C
D—lowest passing grade; passing minimal objectives of the course.
E—conditional failure; failure to achieve minimal objectives, but only to such limited extent that credit can be obtained by examination or

otherwise without repeating the entire course. This grade represents failure in the course unless and until the record is duly changed within one semester. It cannot be changed to a grade higher than a "D."

F—failure to achieve minimal objectives of the course. The student must repeat the course satisfactorily in order to establish credit in it.

For courses taken under the Pass/Not Pass option:

P—Passing grade; equivalent to grade of A, B, or C

N—Not Passing

For zero credit courses (including thesis research but not including laboratory portions of courses in which, for purposes of scheduling, separate course designations and separate class cards are used for the laboratory sections):

S—satisfactory; meets course objectives.

U—unsatisfactory; does not meet course objectives.

For incomplete work, either credit or noncredit:

O—incomplete; no grade; a temporary record of work which was interrupted by unavoidable absence or other causes beyond a student's control, and which work was passing at the time it was interrupted. An instructor may require the student to secure the recommendation of the student affairs officer that the circumstances warrant a grade of incomplete. On the record a grade of "O" will be equivalent to a "W" unless and until the record is duly changed within one semester.

PO—Passing-Incomplete; no grade; same as O except that student was enrolled under the Pass/Not Pass option.

Directed grades. The registrar is directed to record the following grades and symbols under special circumstances:

W—withdrew; a record of the fact that a student was enrolled in a course and withdrew or cancelled the course after the last date for late registration and adding courses.

WF—withdrew failing; a record of course cancellation after the last date for cancelling a course without grade, at which time, according to a statement from the instructor, the student was not passing in his work. This grade counts in all respects as a failing grade.

A grade of "WF" may be directed by the dean of men, the dean of women, or the Committee on Scholastic Delinquency and Readmission when a student is dropped from a course for serious scholastic delinquency.

WN—Withdrew Not-Passing; a record of cancellation of a course taken under the Pass-Not Pass option. Otherwise the same as the WF except that it does not affect index computation.

GOOD STANDING

For purposes of reports and communications to other institutions and agencies and in the absence of any further qualification of the term, a student shall be considered in good standing unless he has been dismissed, suspended, or dropped from the University and has not been readmitted.

SCHOLARSHIP INDEXES

The scholastic standing of all regular students enrolled in programs leading to an undergraduate degree shall be determined by two scholarship indexes, the Semester Index and the Graduation Index.

1. The Semester Index is an average determined by weighing each grade received during a given semester by the number of semester hours of credit in the course.

2. The Graduation Index is a weighted average of all grades received by a student while in the curriculum in which he is enrolled plus all other grades received in courses taken in other curricula offered by the University and properly accepted for satisfying the requirements of the curriculum of the school in which the student is enrolled. With the consent of his adviser, a student may repeat a course. In the case of courses which have been repeated or in which conditional grades have been removed by examination or for which a substantially equivalent course has been substituted, the most recent grade received shall be used. A minimum graduation index of 4.00 is required for graduation.

3. For the purpose of averaging, each grade shall be weighted in the following manner:

A—6 x semester hours = index points
B—5 x semester hours = index points
C—4 x semester hours = index points
D—3 x semester hours = index points

E, F, WF 2 x semester hours = index points
O, W not included
P, N, O, PO, W, WN not included

Graduation Index Requirement

For the bachelor's degree: the required minimum Graduation Index is 4.00.
For the associate degree: the required minimum Graduation Index is 3.90.

SCHOLASTIC PROBATION

A candidate for the bachelor's or associate degree shall be placed on probation if his semester or graduation index at the end of any semester is less than that required for a student with his classification as shown in Table A. A student on probation shall be removed from that status at the end of the first subsequent semester in which he achieves semester and graduation indexes equal to or greater than those required for a student with his classification as shown in Table A. Any grade change due to a reporting error will require reconsideration of probation status.

Temporary students who do not achieve academic standing required of regular students may be discontinued. Probation is concerned only with the regular semesters and not with the summer sessions and intensive courses.

TABLE A. INDEX LEVELS FOR PROBATION

S = Semester Index; G = Graduation Index

Classification	S	G
1	3.5	3.5
2	3.5	3.5
3	3.6	3.75
4	3.6	3.90
5	3.7	3.95
6	3.7	4.0
7	3.7	4.0
8 and up	3.7	4.0

DROPPING OF STUDENTS FOR SCHOLASTIC DEFICIENCY

A student on scholastic probation shall be dropped from the University if at the close of any semester the semester or graduation index is less than that required of a student with his classification as shown in Table B. This rule shall not apply for the semester in which the student completes all requirements for his degree. A student dropped by this rule and later duly readmitted as a regular student shall be readmitted on probation.

TABLE B. INDEX LEVELS FOR DROPPING

S = Semester Index; G = Graduation Index

Classification	S	G
1*	3.2	3.2
2	3.3	3.3
3	3.4	3.5
4	3.4	3.6
5	3.5	3.7
6	3.5	3.8
7	3.5	3.85
8 and up	3.5	3.9

DISTINGUISHED STUDENTS

Regular undergraduate students, carrying at least 14 semester hours, who successfully complete all their courses with a grade "C" or higher and obtain a semester scholarship index of 5.50 or better will be designated as distinguished for that semester.

DEGREES WITH DISTINCTION

Degrees are awarded at the end of each semester and summer session to candidates who have completed the requirements of their schools. At each of these periods degrees with distinction are awarded to those completing the undergraduate plans of study under the following rules:

1. Distinction at graduation shall be awarded on the basis of all course work taken. Baccalaureate degrees with distinction shall be granted only to those who complete the four (or five) year curricula at Purdue and not to those who complete only the first three years at Purdue.

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* Affects only students entering on probation.

2. A candidate for the baccalaureate degree with distinction must have earned at least 70 hours of credit at Purdue. A candidate for an associate degree with distinction must have earned at least 45 hours of credit at Purdue.

For any student to qualify for distinction, his scholarship index for all work completed must be at least 5.00.

3. If the number of graduates in any school who qualify for distinction under rules (1) and (2) exceeds one-tenth of the total number of graduates from that school and for that semester or summer session, the number of degrees with distinction shall be limited to one-tenth of the class in that school, and those graduates with highest indexes shall be included. In administering this rule all baccalaureate engineering graduates will be considered as one school and all associate degree graduates will be considered as one school.

4. Of those students who qualify for distinction under these rules, the three-tenths of the baccalaureate graduates having the highest indexes shall be designated as graduating with highest distinction, irrespective of the schools to which they may belong. The three-tenths of the associate degree graduates having the highest indexes will be designated as graduating with highest distinction.

5. No student with a record of faculty discipline shall be included without special approval by the faculty.

RECOGNITION OF HIGH SCHOLASTIC ATTAINMENT

A faculty committee is charged with the duty of recognizing students of superior ability and of assisting such students to receive the greatest possible benefits from their college careers.

High scholastic attainment is recognized by citation for distinguished scholarship. Those placed on the list of distinguished students, published after the close of each semester, are entitled to special privilege as follows:

> Honor students of all classes are offered the opportunity to do, for credit toward graduation, work in addition to their regular schedule of studies. These additional assignments must have the approval of the head of the school involved. In order to make such additional work practicable the following special concessions may be granted:
>
> 1. Regular assignment of such additional subjects as the schedule will permit.
> 2. Assignments outside class under the supervision of an instructor.
> 3. Opportunities to gain credit in a subject by special examination.
> 4. Special arrangements as approved by the head of the school involved.
> 5. Some flexibility in the application of the system of prerequisites to these students.
>
> Detailed reports of special arrangements under numbers 2 and 4 above are to be filed by the instructor with the dean of the school involved, with a recommendation concerning the amount of credit to be granted.

Students who in the judgment of one or more faculty members merit citation for special distinguished achievement shall have their names presented through the heads of instructional departments or directly to the Committee on Students of Superior Ability, together with such evidence of achievement as is available. The criteria for selecting students in this group are: (1) original thinking of consistently good quality; (2) achievement other than class work—publication of literary, artistic, or scientific work; (3) work which requires great ingenuity or industry, but which may not lead to definite publication; and (4) independent projects of reasonable magnitude carried out by the student on his own initiative.

Projects carried out by such students may receive special achievement credit. Students in this group are not eligible for the special privileges listed above for distinguished students.

Graduate Study

Graduate programs at Purdue University Calumet Campus provide qualified students the opportunity to complete most requirements for a master's degree. Since all graduate programs at Calumet Campus operate under the supervision of Lafayette Campus parent departments, individual Calumet graduate courses supply credit according to qualifications established for the entire University. Only courses approved by a student's advisory committee and by the dean of the Graduate School may form the plan of study for the master's degree.

PRINCIPAL AREAS OF GRADUATE STUDY

The University has now approved the following master's degree programs for Calumet Campus:

1. Master of Arts in Teaching (Major in Mathematics)
2. Master of Arts (Major in English)
3. Master of Arts (Major in History)
4. Master of Science (Major in Biology)
5. Master of Science in Engineering
6. Master of Science in Education in:
   a. Administration
   b. Educational Media
   c. Elementary Education
   d. Guidance and Counseling
   e. Secondary Education with majors in Biology, Educational Media, English, History, Industrial Education, Mathematics, and Political Science.

Complete programs available at the Calumet Campus are those for the Master of Arts in Teaching (Major in Mathematics), the Master of Arts (Major in English), and Master of Science in Engineering. All required courses for the other listed programs are not currently offered at the Calumet Campus. Normally the one, two or three courses needed for completion of the degree requires one full-time summer session, or its equivalent, at the Lafayette campus. In addition to these, Calumet Campus offers portions of other graduate programs. The Calumet Office of Admissions can provide further information on all campus graduate programs.

GRADUATE PROGRAM IN ENGINEERING

A special graduate program is currently offered at the Calumet Campus allowing students to pursue a degree of Master of Science in Engineering. This program was set up to meet the needs of engineers in the local area and is so administered that qualified students may earn a master's degree by taking all of their course work away from the Lafayette campus.

The course of study consists of a primary area of 21 credit hours in appropriate engineering courses and two related areas of six credit hours each, usually one in mathematics and one in physics. Substitutions can be made, however, in course areas. In general, this program involves an interdisciplinary approach with emphasis placed on the basic engineering sciences. A written thesis is not required.

Primary Area: Engineering

ME 500—Thermodynamics
ME 509—Intermediate Fluid Mech.
A&ES 507—Basic Mechanics III
CE 570—Advanced Structural Mechanics
EE 595—Selected Topics in Electrical Engineering
EE 697—Selected Topics in Electrical Engineering
Elective
Elective

The electives are usually taken from the following courses:

A&ES 535—Theory of Material Properties
ME 505—Heat and Mass Transfer
CE 573—Basic Vibrations
EE 643—Pulse Techniques
EE 555—Semiconductor-Circuit Analysis
ME 510—Gas Dynamics
ME 550—Introduction to Missile and Space Systems Design

Related Areas

I: Mathematics

MA 510—Advanced Calculus
MA 525—Introduction to Complex Analysis

II: Physics

PHYS 550—Introduction To Quantum Mechanics
PHYS 556—Introductory Nuclear Physics

Experience indicates that a well-qualified person employed in industry on a full-time basis should not take more than one three-credit hour course per semester, thus requiring five and one half years to complete the program, unless released time is made available to study at the Lafayette campus during summer sessions or in the academic year.

The same standards are required for admission to regional campuses as are required for admission to the Lafayette campus programs.

ADMISSION

Regular (degree-seeking) Graduate Students

Because admission to the Graduate School occurs upon recommendation by the parent department, applicants should apply for regular admission to the Graduate School in Lafayette or to the appropriate department of study in Lafayette, submitting official transcripts of all previous college or university studies and any other documents the department may require. (See Graduate Bulletin). Applicants should show promise of ability and hold a baccalaureate degree from an accredited institution. After admission, degree candidates must follow a formal plan of study (see Advisory Committee and Plan of Study Sections below).

Non-degree (temporary) Graduate Students

Persons who wish to register for individual graduate courses should apply for temporary admission at the Office of Admissions, Calumet Campus. Nondegree graduate students may later become regular graduate students by completing the degree candidate's application and securing regular admission to the Graduate School as indicated above. However, such applicants can apply to a Purdue advanced degree program no more than nine semester hours credit earned while a temporary student.

Graduate Record Examination

Among those who apply for regular admission to the Graduate School, any applicant in one or more of the following categories must take the Aptitude Test Section of the Graduate Record Examination:

1. Those who hold a baccalaureate degree from a non-accredited institution.
2. Those who feel their previous academic record does not adequately reflect their ability.
3. Those who are applying for admission to a department with such a requirement.
4. Those who are to be considered for an assistantship or fellowship appointment.

The Educational Testing Service, 20 Nassau Street, Princeton, New Jersey, can advise applicants of testing dates and locations, as does the Graduate School Calendar.

General Regulations

Standards of Work

Only grades of C or above are acceptable in the Graduate School, including prerequisite courses. The same scholastic requirements which are in effect during the regular academic year are applicable in the summer session. A department or a candidate's advisory committee may require higher performance than a grade of C. Each semester the major department and the dean of the Graduate School will review each student's progress, and unsatisfactory performance may lead to dismissal from the Graduate School.

English Requirement

A regular graduate student may not ask for the appointment of an advisory committee or file a plan of study until he has met the English proficiency requirement or has taken steps to meet it. Students whose native language is English satisfy the English requirement if they (1) received no grade below B in undergraduate composition courses or (2) make a scaled score of at least 600 on the Verbal Aptitude Section of the Graduate Record Examination, or at least 36 on the verbal portion of the Admission Test for Graduate Students in Business. Regular Graduate Students who fail to meet these criteria must satisfy the requirement without delay by writing an acceptable test paper for the Committee on Standards in English.

Foreign Language Requirement

The Graduate School has no general foreign language requirement for the master's degree. Some departments, however, do require a reading knowledge of French, German, or Russian. Normally, the required foreign language should be pertinent to the field of study, since the principal purpose of the foreign language is to serve as a research tool.

Two options exist to satisfy the language requirement:

Option A entails a two-hour translation examination prepared from material submitted by the student's department, administered by the Department of Modern Languages, and approved by the foreign language examiner. The use of dictionaries is permitted. A student may not select Option A if currently enrolled in either semester of Option B. He may select Option A three times, but thereafter must take Option B.

Option B requires a student to complete a two-course sequence oriented toward reading proficiency. He may not audit the courses. At Calumet Campus 601/603 and 601/605 sequences can be provided for French, German, and Russian.

Undergraduate and Transfer Credit

Students may apply credits earned beyond the baccalaureate degree at Purdue or elsewhere toward an advanced degree. The schools and departments of the University determine the conditions of such credit transfer, except that no credit transfer can be allowed toward the master's degree before a student completes one semester of satisfactory work at Purdue.

Advisory Committee

Each regular graduate student must have an advisory committee, usually consisting of three members, to assist him in preparing his plan of study, to advise him during his graduate work, and, in the case of the thesis option, to advise him in his thesis research and writing. To chair this committee the student selects, with approval of the head of the major school or department, his major professor, who will also supervise the candidate's program. The relationship of student and major professor must be mutually acceptable. Together, they must agree on related areas of study, from each of which they choose one professor to serve on the advisory committee, adding other members if advisable. With the exception of the chairman, committee members need not be professors with whom the student has taken, or will take, course work. After its formation, the advisory committee, as approved by the heads of the departments of the primary and related areas of study, must be presented for formal approval by the dean of the Graduate School, who may appoint additional members if advisable.

Plan of Study

The student's plan of study includes a primary area and a related area, or areas, chosen on the basis of his interests and needs. During his first semester of graduate work, the student and his advisor should arrange a tentative plan of study. Before his final semester the student must submit a formal plan of study, approved by his advisory committee and the head of the major school or department, to the Dean of the Graduate School. The formal plan must include the specific courses the student expects to complete and all other requirements of his master's degree program, with semester-hour requirements and course acceptability determined by the appropriate department or administrative unit.

Admission to Candidacy

Admission to candidacy for the master's degree is granted only after approval of the formal plan of study. A candidate for any advanced degree must be registered during the semester in which the degree is to be awarded. The diploma fee must be paid before noon on the Friday preceding graduation, or earlier by special announcement.

Oral and Written Examinations

The Graduate School has no general requirements for oral or written examinations for the master's degree. These are established by the advisory committee or the department. A final examining committee appointed for each candidate must certify to the Graduate School that the student has met the requirements of his major department.

Additional Information

Consult the *Graduate School Bulletin* for further information concerning regulations and descriptions of courses.

Plans of Study and Description of Courses

Courses numbered 1 to 499 are primarily for undergraduate students. Courses numbered 500 to 599 are for undergraduates (usually juniors and seniors) and graduate students. Courses numbered 600 and above are for graduate students.

For each course the first part of the description should be interpreted as follows: first, the official number of the course; second, its special title; and third, the number of class, laboratory, and credit hours. The abbreviation in parentheses gives the class, semester of the students and the initial(s) of the school or area of major work. The prefix "el." or "op." indicates that the course is elective or optional and not required for the students specified.

ABBREVIATIONS

A&D—Art and Design
A&ES—Aeronautical and Engineering Sciences
AGEC—Agricultural Economics
AGR—Agriculture
AGRY—Agronomy
ART—Architectural Technology
AT—Aviation Technology
BCHM—Biochemistry
BIOL—Biological Sciences
CE—Civil Engineering
CET—Civil Engineering Technology
CHE—Chemical Engineering
CHM—Chemistry
CHT—Chemical Technology
C&T—Clothing and Textiles
CS—Computer Science
CPT—Computer Technology
ECON—Economics
ED—Education
EE—Electrical Engineering
EET—Electrical Engineering Technology
EG—Engineering Grapics
ENGL—English
ENGR—Engineering
ENTM—Entomology
ESC—Engineering Sciences
F&N—Foods and Nutrition
FOR—Forestry and Conservation
FR—French
GER—German
GNT—General Studies, Technology
GS—General Studies
HIST—History
IED—Industrial Education
IET—Industrial Engineering Technology
INDM—Industrial Management
INSM—Institutional Management
IS—Industrial Supervision
MA—Mathematics

ME—Mechanical Engineering
MSE—Materials Sciences and Metallurgical Engineering
MET—Mechanical Engineering Technology
MTT—Metallurgical Engineering Technology
MUS—Music History and Theory
NT—Nursing
PEMN—Physical Education for Men
PEW—Physical Education for Women
PHCH—Pharmaceutical Chemistry
PHIL—Philosophy
PHYS—Physics
POL—Political Science
PSY—Psychology
RUSS—Russian
SOC—Sociology
SPAN—Spanish
SPE—Speech
STAT—Statistics
THTR—Theater

School of Agriculture

Dean Kohls in charge, Lafayette

The School of Agriculture trains students for many types of agricultural work, including not only farming but also related educational and industrial activities. Nine departments in the School of Agriculture offer optional programs preparing students for jobs in research, teaching, and extension, as well as in various related commercial enterprises. Instructional work is based on fundamental training in biology, chemistry, and physics, together with courses in history, economics, English, psychology, and other similar fields.

Students in Northwest Indiana are being offered the opportunity to complete the first two years of requirements for Purdue's Bachelor of Science Degree in Agriculture at the Calumet Campus. After the two-year course of study at Calumet, students may complete requirements for graduation at the Lafayette Campus.

FRESHMAN YEAR

First Semester

(3) ENGL 101 (English Composition I)
(4) BIOL 108 (Introduction to Zoology)
(3) CHM 111 (General Chemistry)
(3) MA 153 (Algebra & Trigonometry I)
(3-6) Agricultural Courses

(16-19)

Second Semester

(3) SPE 114 (Fundamentals of Speech Communication)
(4) BIOL 109 (Introduction to Botany)
(3) CHM 112 (General Chemistry)
(3) MA 154 (Algebra & Trigonometry II)
(0) AGR 101 (Agricultural Lecture)
(3-6) Agricultural Courses

(16-19)

SOPHOMORE YEAR

Third Semester

(3) ECON 210 (Principles of Economics)
(4) PHYS 220 (General Physics)
(4) CHM 251 (Organic Chemistry)
(1) CHM 251L (Organic Chemistry Laboratory)
(3-6) Agricultural Courses

(15-18)

Fourth Semester

(3) ENGL 102 (English Composition II)
(4) BIOL 221 (Introduction to Microbiology)
(3-4) Elective
(6-8) Agricultural Courses

(16-19)

The above courses will be offered as indicated each year. In addition, the following listed courses will be offered on a retaking basis as indicated on the following page.

The following courses will be offered as indicated below:

Freshman Electives	**To Be Offered**
(0) AGR 101 (Agricultural Lecture)	Every Year
(3) AGEC 100 (Introductory Agricultural Business and Economics)	Every Other Year
(3) AGRY 105 (Crop Production)	Every Other Year
(3) AFSC 101 (Animal Agriculture)	Every Other Year
(3) ENTM 100 (Introductory Entomology)	
(3) HORT 101 (Fundamentals of Horticulture)	Every Other Year
(2) FOR 103 (Conservation)	Every Year
Sophomore Electives	
(3) AGEC 320 (Marketing Farm Products)	
(3) AGEC 330 (Management of Business Related to Agriculture)	Every Other Year
(3) AGRY 255 (Soil Management)	Every Other Year
(3) ANSC 221 (Feeds and Feeding)	Every Other Year
(4) BCHM 207 (Agricultural Chemistry)	Every Other Year
(3) AGRY 430 (Genetics)	Every Year

The courses scheduled for 1969-70 are AGR 101; AGRY 105, 255, 430; FOR 103, 582; and HORT 101.

AGRICULTURE

UNDERGRADUATE LEVEL

Lower-Division Courses

101. **AGRICULTURAL LECTURES.** Sem. 1. Class 1, cr. 0. (1 A, F, FST).

To acquaint new students in agriculture with the important problems and opportunities in the various fields of agriculture.

AGRICULTURAL ECONOMICS

100. **INTRODUCTORY AGRICULTURAL BUSINESS AND ECONOMICS.** Class 3, cr. 3. (el. 1 or 2 A).

The role and characteristics of farm and off-farm agricultural businesses in our economy; introductory economic and business principles involved in successful organization, operation, and management.

320. **MARKETING FARM PRODUCTS.** Sem. 1 and 2. Class 3, cr. 3. (el. 3 to 8A).

Types of markets; middlemen and their services; relationship of production and consumption; price determining factors. Consideration given to major marketing issues, such as decentralization, integration, costs and margins, government regulations, marketing orders, promotion, grades and standards, and cooperatives.

AGRONOMY

105. **CROP PRODUCTION.** Sem. 1 and 2. SS. Class 2, Lab. 2, cr. 3. (el. 1, 2 A).

Fundamental principles in crop production, distribution, rotations, soil relations; grain and forage crops adaptation, characteristics, harvesting, storage, and marketing.

255. SOIL SCIENCE. Sem. 1 and 2. SS. Class 2, Lab. 2, cr. 3. (el. 3 or 4 A). Prerequisites: CHM 111 and 112, or equivalent.

Soil management and fertility. Designed for students taking only one course in soils.

430. GENETICS. Class 3, cr. 3. Must be preceded by BIOL 108 or 109 or equivalent.

For science and agriculture students. Basic principles of heredity, and an introduction to human genetics and plant and animal breeding.

430L. GENETICS LABORATORY. Lab. 2, cr. 1. Prerequisite or corequisite: AGRY 430.

Genetics laboratory experiments with plants, Drosophila, bacterial phage, and bacteria to acquaint the student with techniques and problem solving.

BIOCHEMISTRY

100. INTRODUCTION TO BIOCHEMISTRY. Sem. 1. Class 2, Lab. 3, cr. 3.

Modern biochemistry and its applications in agriculture, biology, and industry.

207. BIOCHEMISTRY. Sem. 1 and 2. Class 3, Lab. 3, cr. 4. (el. 4 to 8 A, F, H, S). Prerequisite: CHM 257 or equivalent.

Introduction to the chemistry, function, and metabolism of compounds found in the living organism.

ANIMAL SCIENCES

UNDERGRADUATE LEVEL

Lower-Division Courses

101. ANIMAL AGRICULTURE. Class 3, cr. 3. (el. 2 to 4 A).

Importance of livestock in the field of agriculture, and the place of meats and other animal products in the human diet.

221. INTRODUCTORY ANIMAL NUTRITION. Sem. 1 and 2. SS. Class 3, cr. 3. (el. 3 to 6A). Prerequisite: CHM 111 or 112, or equivalent.

A study of the digestive processes, composition of feedstuffs, nutritional requirements, and formulation of practical rations for farm animals.

ENTOMOLOGY

100. INTRODUCTORY ENTOMOLOGY. Class 2, Lab. 2, cr. 3. (el. 1 to 4 A, S, H, PEM).

The structure, biology, and classification of insects and the principles of insect control.

FORESTRY AND CONSERVATION

103. CONSERVATION. Class 2, cr. 2. (1 F, 2 cr.; el. 5, 6, 7, 8, 2 or 3 cr.).

Development and use of natural resources, with special emphasis on renewable natural resources. Lectures. Directed program of supplemental reading for additional credit.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

582. CONSERVATION OF NATURAL RESOURCES. Sem. 1 and 2. Class 2, Lab. 3, cr. 3. (el. 5 to 8 A, H, S).

Classroom and laboratory instruction in natural resource conservation. Designed for teachers of vocational agriculture, biological sciences, general sciences, home economics, and social studies.

HORTICULTURE

101. FUNDAMENTALS OF HORTICULTURE. Sem. 1. Class 2, Lab. 2, cr. 3. (el. 1 or 3 A).

A study of the biology and technology involved in the production, storage, processing and marketing of horticultural plants and products. Laboratories include: field trips to horticultural farms and industries, experiments to demonstrate both the theoretical and practical aspects of horticultural plant growth and development, and exercises in landscape design.

Schools of Engineering

Dean Grosh in charge, Lafayette
Professor Battenburg, chairman, Calumet Section

PROFESSIONAL ENGINEERING has been defined as the art and science which adapts materials found in nature to more useful forms and harnesses natural forces to do man's work, at a reasonable cost in both time and energy. As a result of his education and training, the professional Engineer is able to apply the scientific method and perspective to solve problems, create new products, and assume responsibility in fields of research, designing, manufacturing and managing.

The engineering curriculum provides the opportunity for a thorough education in the physical sciences, the engineering sciences and mathematics and the application of these fundamentals to the solution of problems encountered in engineering practice. The curriculum also enables the engineering student to develop capabilities in the effective communication of ideas by means of spoken and written language as well as graphical techniques. Finally, the engineering curriculum affords a sound introduction to the social studies and humanities. Thus the engineering student, through his studies, work experiences, and membership in professional societies, receives the foundation to prepare him to enter the practice of professional engineering or to begin a program of graduate studies.

Students can pursue their engineering studies on the Calumet Campus in various curricula. A newly established four-year interdisciplinary program now permits students to receive an engineering degree from the regional campus. This program provides a very flexible curriculum, drawn from existing Purdue engineering courses and leads to a B.S.E. (Bachelor of Science in Engineering degree). Such a program permits students to concentrate their efforts in the traditional engineering disciplines or allows them considerable latitude in designing a course of study especially suited to their interests. Graduates of the interdisciplinary curriculum would be fully qualified for immediate employment. They might, however, pursue professional engineering specialties in programs at Purdue leading to a master's degree in keeping with a now well-established trend to pursue a fifth year of study before entering the profession.

In addition to the B.S.E. program, instruction is also available in the following engineering disciplines: instruction through the sophomore year in aeronautical engineering, agricultural engineering, chemical engineering, civil engineering, engineering sciences, industrial engineering, mechanical engineering and metallurgical engineering and instruction through the junior year in electrical engineering.

Only those students with adequate preparatiton will be expected to accomplish the freshman year of study in two semesters. Students with inadequate background training, particularly in mathematics and chemistry may require an additional semester or summer session to attain sophomore standing.

BACHELOR OF SCIENCE IN ENGINEERING

FRESHMAN YEAR

First Semester

(5) MA 161 (Mathematics for Engineering and the Physical Sciences I)
(4) CHM 115 (General Chemistry)
(3) ENGR 190 (Elementary Engineering Design)
(3) ENGL 101 (English Composition I)

(15)

Second Semester

(5) MA 162 (Mathematics for Engineering and the Physical Sciences II)
(4) CHM 116 (General Chemistry)
(4) PHYS 152 (Mechanics and Sound)
(3) SPE 114 (Fundamentals of Speech Communication)

(16)

SOPHOMORE YEAR

Third Semester

(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)
(4) PHYS 261 (Electricity and Optics)
(2) ESC 221 (Basic Mechanics I)
(3) EE 201 (Introduction to Electrical Engineering)
(1) EE 207 (Electrical Engineering Laboratory I)
(3) General education elective

(17)

Fourth Semester

(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(3) STAT 511 (Statistical Method I)
(3) ESC 206 (Basic Mechanics II)
(3) EE 202 (Linear Electronic Circuits)
(2) EE 208 (Electrical Engineering Laboratory II)
(3) IE 386 (Work Analysis)

(18)

JUNIOR YEAR

Fifth Semester

(3) ME 305 (General Thermodynamics I)
(4) ME 310 (Fluid Mechanics)
(3) ESC 223 (Mechanics of Materials)
or
EE 251 (Introduction to Nonlinear Circuits)*
(3-4) MA 501 (Technical Applied Math I)
or
EE 301 (Signals and Systems)*
(3) General education elective

(16-17)

Sixth Semester

(4) ME 315 (Heat and Mass Transfer)
(3) ME 340 (Measurements and Computers)
(2-3) CE 334 (Materials Science)
or
MSE 411 (Engineering Materails)*
or
EE 352 (Introduction to System Design)*
(6) Technical electives†

(15-16)

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* Students will be expected to complete the ESC 223 and CE 334 or MSE 411 sequence, or the EE 251, 301, 352 sequence.

† Students will be required to complete a nine credit hour technical elective sequence to provide depth.

SENIOR YEAR

Seventh Semester

(3) EE 483 (Automatic Control Systems)
or
ME 475 (System Analysis and Control)
(3) Design course
(9) Technical electives

(15)

Eighth Semester

(3) Design course
(9) General Education Elective

(12)

Total credits—124 hours, minimum.

CURR. REQUIRED 133 HOURS

INSTRUCTION IN ENGINEERING DISCIPLINES

In order to give the student sufficient time to adjust himself and to choose the branch of engineering for which he is best adapted, the following program of study during the freshman year is common for all engineering curricula.

FRESHMAN ENGINEERING

Program A: Students fully qualified upon entrance.

First Semester

(4) CHM 115 (General Chemistry)
(5) MA 161 (Mathematics for Engineering and the Physical Sciences I)
(3) SPE 114 (Fundamentals of Speech Communication)
(3) or ENGL 101 (English Compostiton I)
or ENGR 110
(2) EG 116 (Engineering Graphics)
(3) Elective

(17)

Second Semester

(4) CHM 116 (General Chemistry)
(5) MA 162 (Mathematics for Engineering and the Physical Sciences II)
(3) ENGL 101 (English Composition I)
(3) or SPE 114 (Fundamentals of Speech Communication)
(4) PHYS 152 (Mechanics and Sound)
(2) EG 117 (Engineering Graphics)

(18)

Program B: Students with below average preparation in mathematics.

First Semester

(4) CHM 115 (General Chemistry)
(5) MA 151 (Elementary Mathematics for Engineering and the Physical Sciences)
(3) ENGL 101 (English Composition I)
(3) or SPE 114 (Fundamentals of Speech Communication)
(2) EG 116 (Engineering Graphics)
(3) Elective

(17)

Second Semester

(4) CHM 116 (General Chemistry)
(5) MA 161 (Mathematics for Engineering and the Physical Sciencces I)
(3) SPE 114 (Fundamentals of Speech Communication)
(3) or ENGL 101 (English Composition I)
(2) EG 117 (Engineering Graphics)
(3) Elective

(17)

Program C: Students with below average preparation in chemistry.

First Semester

(3) CHM 111 (General Chemistry)
(5) MA 161 (Mathematics for Engineering and the Physical Sciences I)
(3) SPE 114 (Fundamentals of Speech Communication)
(3) or ENGL 101 (English Composition I)
(3) EG 116 (Engineering Graphics)
(3) Elective
(18)

Second Semester

(4) CHM 115 (General Chemistry)
(5) MA 162 (Mathematics for Engineering and the Physical Sciences II)
(3) ENGL 101 (English Composition I)
(3) or SPE 114 (Fundamentals of Speech Communication)
(4) PHYS 152 (Mechanics and Sound)
(3) Elective
(2) EG 117 (Engineering Graphics)
(19)

Program D: Students with below average preparation in chemistry and mathematics.

First Semester

(3) CHM 111 (General Chemistry)
(5) MA 151 (Elementary Mathematics for Engineering and the Physical Sciences)
(3) ENGL 101 (English Composition I)
(3) or SPE 114 (Fundamentals of Speech Communication)
(2) EG 116 (Engineering Graphics)
(3) Elective
(16)

Second Semester

(4) CHM 115 (General Chemistry)
(5) MA 161 (Mathematics for Engineering and the Physical Sciences II)
(3) SPE 114 (Fundamentals of Speech Communication)
(3) or ENGL 101 (English Composition I)
(2) EG 117 (Engineering Graphics)
(3) Elective
(17)

AERONAUTICS, ASTRONAUTICS, AND ENGINEERING SCIENCES

SOPHOMORE YEAR

Third Semester

(2) ESC 221 (Basic Mechanics I)
(4) PHYS 261 (Electricity Optics)
(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)
(6) General Education Elective
(16)

Fourth Semester

(3) ESC 206 (Basic Mechanics II)
(4) PHYS 343 (Modern Physics)
(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(3) STAT 311 (Introduction to Engineering Statistics)
(3) Elective
(17)

AGRICULTURAL ENGINEERING

SOPHOMORE YEAR

Third Semester

(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)
(4) BIOL 108 (Introduction to Botany)
(2) ESC 221 (Basic Mechanics I)
(4) PHYS 261 (Electricity, Optics)
(3) General Education Elective

(17)

Fourth Semester

(3) ESC 206 (Basic Mechanics II)
(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(1) CS 200 (Laboratory on Programming for Digital Computers)
(3) General Education Elective
(4) BIOL 109 (Introduction to Zoology)
(4) ME 308 (Thermophysics)

(19)

CHEMICAL ENGINEERING

SOPHOMORE YEAR

Third Semester

(3) CHM 220 (General Chemistry)
(3) CHE 205 (Chemical Engineering Calculations)
(3) CHM 261 (Organic Chemistry)
(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)
(5) PHYS 251 (Heat, Electricity, and Optics)
(1) CHM 263L (Organic Chemistry Laboratory)

(19)

Fourth Semester

(2) CHE 206 (Introduction to the Chemical Process Industries)
(3) CHM 262 (Organic Chemistry)
(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(4) PHYS 343 (Modern Physics)
(3) CHM 373 (Physical Chemistry)
(1) CHM 264L (Organic Chemistry Laboratory)

(17)

CIVIL ENGINEERING

SOPHOMORE YEAR

Third Semester

(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)
(5) PHYS 251 (Heat, Electricity and Optics)
(2) ESC 221 (Basic Mechanics I)
(2) CE 204 (Engineering Surveys I)
(3) General Education Elective

(16)

Fourth Semester

(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(3) CE 270 (Structural Mechanics I)
(3) ESC 206 (Introduction to Mechanics of Materials)
(3) CE 205 (Engineering Surveys II)
(2) GEOL 397 (Engineering Geology)
(3) General Education Elective

(18)

ELECTRICAL ENGINEERING

SOPHOMORE YEAR

Third Semester

(3) EE 201 (Introduction to Electrical Engineering)
(1) EE 207 (Electrical Engineering Laboratory I)
(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)
(4) PHYS 261 (Electricity and Optics)
(2) ESC 221 (Basic Mechanics I)
(3) General Education Elective

(17)

Fourth Semester

(3) EE 202 (Linear Electrical Circuits)
(2) EE 208 (Electrical Engineering Laboratory II)
(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(3) ESC 206 (Basic Mechanics II)
(3) EE 251 (Introduction to Nonlinear Circuits)
(3) General Education Elective

(18)

JUNIOR YEAR

Fifth Semester

(4) EE 301 (Signals and Systems)
(1) EE 307 (Electrical Engineering Laboratory III)
(3) EE 311 (Electric and Magnetic Fields)
(3) EE 302 (Probabilistic Methods in Electrical Engineering)
(6) General Education Elective

(17)

Sixth Semester

(1) EE 308 (Electrical Engineering Laboratory IV)
(3) EE 321 (Electromagnetic Energy Conversion Principles)
(3) EE 352 (Introduction to System Design)
(4) ME 308 (Thermophysics)
(3) PHYS 342 (Modern Physics)
(1) PHYS 342L (Modern Physics Laboratory)
(3) General Education Elective

(18)

INDUSTRIAL ENGINEERING

SOPHOMORE YEAR

Third Semester

(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)
(4) PHYS 261 (Electricity, Optics)
(2) ESC 221 (Basic Mechanics I)
(3) General Education Elective
(3) Elective

(16)

Fourth Semester

(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(3) PHYS 342 (Modern Physics)
(3) ME 200 (Thermodynamics I)
(3) ESC 206 (Mechanics II)
(3) STAT 311 (Introduction to Engineering Statistics)
(3) Elective

(19)

MATERIALS SCIENCE AND METALLURGICAL ENGINEERING

SOPHOMORE YEAR

Third Semester	Fourth Semester
(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)	(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(5) PHYS 251 (Heat, Electricity, and Optics)	(4) PHYS 343 (Modern Physics)
(2) ESC 221 (Basic Mechanics I)	(4) CHM 373 (Physical Chemistry)
(6) General Education Elective	(3) ESC 206 (Mechanics II)
(17)	(15)

MECHANICAL ENGINEERING

SOPHOMORE YEAR

Third Semester	Fourth Semester
(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)	(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(4) PHYS 261 (Electricity, Optics)	(3) ME 200 (Thermodynamics I)
(3) ME 261 (Introduction to Engineering Design)	(3) ESC 206 (Mechanics II)
(2) ESC 221 (Basic Mechanics I)	(3) EE 231 (Electrical Engineering I)
(3) General Education Elective	(3) General Education Elective
	(3) Elective
(16)	(19)

GENERAL EDUCATION PROGRAM

A minimum of 24 hours of general education courses is required in most of the engineering curricula, and these hours are distributed as indicated below.

1. Six credit hours in communications are required in the freshman engineering program. These are ENGL 101 or 103 and SPE 114.

2. The remaining 18 credit hours must be selected from two groups of course sequences.

3. Each student must select one 12-hour sequence from one group and one 6-hour sequence from the other. No student may elect a 6-hour sequence from the same group from which he chose a 12-hour sequence.

Group I	Group II
Languages	Literature
Economics	Speech and Theatre
Political Science	Independent Reading
Psychology	History
Sociology	Philosophy
	Creative Arts
	General Studies

The above sequences provide depth to the various programs in the social sciences, fine arts, and humanities.

A pamphlet is available from student counselors for the benefit of all the engineering students, stating the objectives of the program in general education. Included in the pamphlet are an analysis and description of the objectives of each of the sequences.

FRESHMAN ENGINEERING

Dean Gerde in charge, Lafayette

UNDERGRADUATE LEVEL

Lower-Division Courses

100. FRESHMAN ENGINEERING LECTURES. Sem. 1 and 2. Class 1, cr. 0. (1 ENGR).

An introduction to the engineering profession.

110. INTRODUCTION TO DIGITAL COMPUTERS. Sem. 1. Class 2, Lab. 3, cr. 3. (1 ENGR).

An introduction to numerical analysis and digital computers.

190. ELEMENTARY ENGINEERING DESIGN. Sem. 1 and 2. Class 2, Lab. 3, cr. 3. (1 or 2 ENGR).
head.

An introduction to engineering design.

SCHOOL OF AERONAUTICS, ASTRONAUTICS, AND ENGINEERING SCIENCES

Professor Lo in charge, Lafayette

207. BASIC MECHANICS I. SS only. Class 3, cr. 3. Prerequisites: MA 162 and PHYS 152.

Fundamental concepts, force systems, graphical representation of force systems, equilibrium, distributed forces, hydrostatics, virtual work, static stability, friction. First and second moments of areas, volumes, and masses, center of gravity. Application to structural and machine elements, such as bars, beams, trusses, cables, friction devices.

208. BASIC MECHANICS II. Sem. 1 and 2, and SS. Class 3, cr. 3. (4 IE, 4 ME) 4 CE, 4 AGE. Prerequisites: ESC 205 or ESC 221 and MA 261.

Fundamental concepts, kinematics, translation, and rotation. Kinetics, impulse, momentum, work, energy. Rectilinear and curvilinear translation of point masses. Plane motion of rigid bodies and vibration. Application to projectiles, gyroscopes, machine elements, and other engineering systems.

221. BASIC MECHANICS I. Sem. 1 and 2. Class 3, cr. 2. (3 AGE, 3 CE, 3 IE, 3 ME, 5 MSE.) Prerequisite: MA 162 and PHYS 152 or equivalent.

Review of vector algebra; resultants and equilibrium of force systems; applications involving structures, machine elements, hydrostatics, friction, etc.; virtual work, potential energy, and static stability; first and second moments of areas, volumes, and masses.

223. MECHANICS OF MATERIALS. Sem. 1 and 2 and SS. Class 3, cr. 3. (5 AGE, 4 CE, 5 IE, 6 ME, 6 MSE.) Prerequisite: ESC 221 or equivalent.

Analysis of stress and strain; equations of equilibrium and compatibility; stress-strain laws; extension, torsion, and bending of bars; membrane theory of pressure vessels; elastic stability; selected topics.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

507. BASIC MECHANICS III. Class 3, cr. 3. Prerequisite: ESC 206 or A&ES 208. Knowledge of differential equations assumed.

Kinematics, fundamental laws of mechanics, constraints, and generalized coordinates, Lagrange equations, virtual work. Applications to particle dynamics, rigid body motion, theory of small oscillations, and stability of motion.

535. THEORY OF MATERIAL PROPERTIES. Class 3, cr. 3. Prerequisites: ESC 312 and ME 306.

Kinetic theory. Atomic structure; the periodic table. Microscopic structure of gases, liquids, and solids. Microscopic models to describe such properties as cohesive energy, elasticity, viscosity, slip, thermal conductivity, diffusion, specific heat, and electrical conductivity. Relations between the mechanical, thermal, and electrical properties of materials. Mechanical models of solids, anelasticity, internal friction.

546. STRENGTH OF MATERIALS. Class 3, cr. 3. Prerequisite: ESC 212, 312, 313 or 316 or equivalent.

Strength of materials as such; true-stress true-strain relations; elastic strength; flow strength; fracture strength; effects of state of stress, temperature, speed of loading, cycles of loading, duration of load, and previous history of the materials.

547. EXPERIMENTAL STRESS ANALYSIS. Class 2, Lab. 3, cr. 3. Admission by consent of instructor.

Theory and application of photoelastic, electric strain gage, and brittle lacquer methods of experimental stress analysis for static and dynamic loadings. Strain gage work will include strain rosettes.

SCHOOL OF CHEMICAL ENGINEERING

Professor Greenkorn in charge, Lafayette

205. CHEMICAL ENGINEERING CALCULATIONS. Class 3, cr. 3. (3 CHE). Prerequisite: CHM 116 or 117, MA 161, PHYS 152, or equivalent.

Quantitative applications of material and energy balances to the chemical process industries. The use of chemical equations, yield of a chemical process; handling of multiple, by-pass, and recycle streams; and introduction to the first law of thermodynamics.

206. STAGEWISE OPERATIONS. Class 2, cr. 2. (4 CHE), Prerequisites: CHE 205, CHM 120 or 126, PHYS 251, or equivalent.

Importance and applications of flow diagrams and equipment and process economics to the chemical process industries. Studies of selected commercial chemical processes. Advanced chemical engineering calculations.

SCHOOL OF CIVIL ENGINEERING

Professor McLaughlin in charge, Lafayette

Engineering Graphics

110. DRAFTING FUNDAMENTALS. Class 1, Lab. 6, cr. 3. (1 IED, el.).

Designed for teachers of drawing. A basic course in drawing; orthographic projection, pictorial sketching, print reading, and reproduction of drawings. Problems designed to require practical reasoning and develop good techniques.

111. ADVANCED DRAFTING. Class 1, Lab. 6, cr. 3. (2 IED, el.). Prerequisite: EG 110.

Preparation of assembly and detail drawings, including fasteners, limit dimensioning, and shop notes. Intersections and developments with sheet metal applications. Symbols and construction details used in architectural drafting.

113. SLIDE RULES AND GRAPHS. Lab. 2, cr. 1. Prerequisite or corequisite: MA 112 or 151.

Principles and use of the slide rule for division, multiplication, trigonometry, powers, and roots. Properties and types of coordinate graphs for scientific and engineering purposes; calculation and plotting graphs: uniform, log, semilog, and others.

114. DRAFTING I. Sem. 1 and 2. Lab. 6, cr. 2 (IED, el.).

A basic course in geometrical constructions, multiview drawing, dimensioning, pictorial drawing, and sketching. Problems designed to require practical reasoning and develop good techniques.

116. GRAPHICS I. Sem. 1 and 2. Class 2, Lab. 4, cr. 2. (1 or 2 ENGR, el.).

Basic graphical methods—instrument and freehand—useful in engineering layout and design for analysis and communication. Multiview representation with some sketching and basic dimensioning practices. Auxiliary views with sectioning and some conventional representations. Engineering lectures and counseling for scheduling by Department of Freshman Engineering.

117. GRAPHICS II. Sem. 1 and 2. Class 2, Lab. 4, cr. 2. (2 or 3 ENGR, el.). Prerequisite: EG 116, or equivalent.

Basic pictorial methods — instrument and freehand—useful in engineering layout and design for analysis and communication. Graphical techniques: vector, calculus-differentiation, and integration. Multiview resolution of intersections of plane and curved surfaces. Engineering lectures and counseling for scheduling by Department of Freshman Engineering.

118. ENGINEERING GRAPHICS. Class 2, Lab. 6, cr. 4. Prerequisite or corequisite: MA 151 or 161.

Graphical methods used in engineering design, layout, and calculation. Multiview and pictorial drawing and sketching of technical objects; basic dimensioning practice; conventional representation.

212. DESCRIPTIVE GEOMETRY. Class 1, Lab. 5, cr. 2 or 3. Prerequisites: EG 110 and 111, or EG 118.

334. **MATERIALS SCIENCE.** Sem. 1 and 2. Class 2, Lab. 1, cr. 2. (6 CE). Prerequisite: CE 333.

Structure of matter. Intermolecular forces, States of aggregation. Response of ideal and real materials to load. Failure and fracture.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

570. **ADVANCED STRUCTURAL MECHANICS.** Sem. 1. Class 3, cr. 3. Prerequisites: ESC 223 and MA 262.

Flexure and torsion; energy methods, Castigliano's theorems, complementary energy theorem. Maxwell-Mohr method; indeterminate structural and machine members; introduction to ultimate load analysis of indeterminate members; beam columns and beam-tension members.

573. **BASIC VIBRATIONS.** Sem. 1 or 2. Class 3, cr. 3. Prerequisites: ESC 223 and MA 262 or equivalent.

Harmonic motion; free and forced vibrations of one degree-of-freedom systems with and without damping; vibration measuring instruments, transmissibility; systems with two or several degrees of freedom; Holzer's method; vibration of rods and beams, critical speed of shafts, Rayleigh and Stodola methods.

SCHOOL OF ELECTRICAL ENGINEERING

Professor Hancock in charge, Lafayette

201. **INTRODUCTION TO ELECTRICAL ENGINEERING.** Class 3, cr. 3. Prerequisites or corequisites: MA 261 and PHYS 261.

Fundamental properties of electric and magnetic circuits. Basic concepts, circuit elements, and source functions. Response of simple circuits. Transformations. Sinusoidal steady-state analysis.

202. **LINEAR ELECTRIC CIRCUITS.** Class 3, cr. 3. Prequisite: EE 201; prerequisite or corequisite: MA 262.

Continuation of EE 201. The complex-frequency plane, impedance and admittance functions, network analysis and theorems, nonsinusoidal periodic functions.

207. **ELECTRICAL ENGINEERING LABORATORY I.** Lab. 3, cr. 1. (3 EE, ME, AgE). Prerequisite or corequisite: EE 201.

Laboratory exercises emphasizing measurement techniques, report preparation, and practical instruments and devices. The experiments will deal primarily with basic circuits.

208. **ELECTRICAL ENGINEERING LABORATORY II.** Lab. 6, cr. 2. (4 EE). Prerequisites or corequisites: EE 202, and EE 207, EE 251.

Continuation of EE 207. A laboratory study of circuits and electronics with special emphasis on basic circuits containing nonlinear active devices.

251. **INTRODUCTION TO NONLINEAR CIRCUITS.**Class 3, cr. 3. (4 EE). Prerequisite or corequisite: EE 202.

Physics of semiconductor devices, vacuum and gas tubes; external characteristics and equivalent circuits. Applications to small- and large-signal amplifiers.

UNDERGRADUATE LEVEL

Upper-Division Courses

301. **SIGNALS AND SYSTEMS.** Sem. 1 and 2. SS. Class 4, cr. 4 (5 EE). Prerequisite: EE 202; prerequisite or corequisite: MA 318.

Deterministic and nondeterminstic signals with emphasis on signal description through the use of Fourier Series, Fourier transforms, probability density, autocorrelation, and special analysis. System description treated by differential equations and extended to include transform methods. System response to both deterministic and nondeterministic signals.

302. **PROBABILISTIC METHODS IN ELECTRICAL ENGINEERING.** Sem. 1 and 2. SS. Class 3, cr. 3. (5EE). Prerequisite: MA 262; prerequisite or corequisite: EE 301.

An introductory treatment of probability theory including distribution and density functions, moments and random variables. Application of normal and exponential distributions. Estimation of means, variances, correlation, and spectral density functions. Random processes and response of linear systems to random inputs.

307. **ELECTRICAL ENGINEERING LABORATORY III.** Sem. 1 and 2. SS. Lab 3, cr. 1. (5 EE). Prerequisite: EE 208; prerequisites or corequisites: EE 301 and EE 311.

Continuation of EE 208. Experimental exercises emphasizing more advanced electronic circuits and introducing simple system concepts.

308. ELECTRICAL ENGINEERING LABORATORY IV. Sem. 1 and 2. SS Lab 3, cr. 1. (6 EE). Prerequisite: EE 307; prerequisites or corequisites: EE 311 and EE 321.

Continuation of EE 307. Laboratory practice and experimental studies related to electromechanical and electromagnetic systems.

311. ELECTRIC AND MAGNETIC FIELDS. Sem. 1 and 2. SS. Class 3, cr. 3. Prerequisite: MA 262; prerequisite or corequisite: EE 202.

Vector alegbra, vector calculus, electrostatics, magnetostatics, time-varying fields, introduction to Maxwell's equations.

321. ELECTROMAGNETIC ENERGY CONVERSION PRINCIPLES. Sem. 1 and 2. SS. Class 3, cr. 3. (6 EE). Prerequisite: EE 301; prerequisites or corequisites: EE 311 and ESC 306.

Treatment of electromechanical energy convertors with emphasis on their dynamic performance. Equivalent-circuit models and block diagrams for translation and rotational energy transducers. Idealized machines and practical machine considerations. Transformers.

352. INTRODUCTION TO SYSTEM DESIGN. Sem. 1 and 2. SS. Class 3, cr. 3. (6 EE). Prerequisite: EE 301.

Feedback, modulation, and digital systems. System specification, design, and limitations. Applications in automatic control, electronics, and communications. Emphasis on analog and digital computer simulation and analysis.

353. ELECTRONICS. Sem. 1 and 2. SS. Class 3, Lab. 3, cr. 4. (6 ME). Prerequisite: EE 202 or 342.

Modeling concepts, analysis of diode, transistor and vacuum tube circuits, introduction to digital systems.

483. AUTOMATIC CONTROL SYSTEMS. Sem. 1 and 2. SS. Class 3, cr. 3. (el.). Prerequisite: EE 301; prerequisite or corequisite: EE 321.

Component and system transfer functions. Transient response to deterministic inputs and definition of time domain specifications. Open and closed loop frequency response. Bode diagrams, Nyquist diagrams, root locus, and frequency specifications. Stability and relative stability criteria. Introduction to synthesis. This course is not recommended for those students who intend to do graduate work in automatic control.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

555. SEMICONDUCTOR-CIRCUIT ANALYSIS. Sem. 1 and 2. Class 3, cr. 3. Prerequisites: EE 352 and EE 402.

Transistors as circuit elements, DC bias and stability, low-frequency small-signal amplifiers, power amplifiers, regulated power supplies, high-frequency models, broad-band low-pass amplifiers, band-pass amplifier, transistors as switches, oscillators, tunnel diodes, tunnel diode circuits.

595. SELECTED TOPICS IN ELECTRICAL ENGINEERING. (el). Hours and credits to be arranged.

643. PULSE TECHNIQUES. Class 3, cr. 3.

697. SELECTED TOPICS IN ELECTRICAL ENGINEERING. Hours and credits to be arranged.

INDUSTRIAL ENGINEERING

Professor Leimkuhler in charge, Lafayette

386. WORK ANALYSIS. Sem. 1 and 2. Class 2, Lab. 2, cr. 3. (6 IE). Prerequisites: IE 330 and IE 343.

Methods engineering and work measurement; the nature of human work; and job evaluation.

543. MANUFACTURING ANALYSIS. Sem. 1 and 2. SS. Class 3, cr. 3. (Available for credit only to honors students in industrial engineering and graduate students from other departments.)

Organization for production, manufacturing processes, process designing, production control, forecasting, inventory control, estimating, data processing and system designing.

544. MANUFACTURING MANAGEMENT. Sem. 1 and 2. SS. Class 3, cr. 3. (Available for credit only to honors students in Industrial Engineering and graduate students from other departments.)

Work methods and measurement, job evaluation, and fundamentals of engineering economy and accounting as applied to manufacturing.

MATERIALS SCIENCE AND METALLURGICAL ENGINEERING

Professor Grace in charge, Lafayette

411. **ENGINEERING MATERIALS.** Sem. 1 and 2. Class 3, cr. 3. (7 ME, 8 ChE, el.). Prerequisites: A course in thermodynamics and a course in strength of materials.

Structure of metals, ceramics, polymers, and other solid engineering materials. Crystallographic principles. Chemical bonding. Crystal imperfections. Phase equilibria. Irreversible processes in solids. Relations of structure to mechanical, physical, and chemical properties. Applications to materials selection and design.

597. **SELECTED TOPICS IN MATERIALS SCIENCE AND METALLURGICAL ENGINEERING.** Sem. 1 and 2. SS. (el.). Hours and credits to be arranged.

MECHANICAL ENGINEERING

Professor McFadden in charge, Lafayette

200. **THERMODYNAMICS I.** Class 4, cr. 3. Prerequisite: MA 261.

First and second laws, entropy, reversible and irreversible process, Maxwell relations, and properties of pure substances and mixtures.

261. **INTRODUCTION TO ENGINEERING DESIGN.** Sem. 1 and 2. SS. Class 2, Lab. 3, cr. 3. (3 ME). Prerequisite or corequisite: ESC 221.

Application of elementary mechanics and physics to open-ended design problems. Mathematical modeling of physical systems. Introduction to basic mechanical elements and sub-systems. Emphasis on design as a creative process implemented by the engineering sciences and systematic decision making.

UNDERGRADUATE LEVEL

Upper-Division Courses

305. **GENERAL THERMODYNAMICS I.** Sem. 1 and 2. Class 3, cr. 3. (5 AE). Prerequisites: MA 262 and PHYS 251 or 261.

First and second laws, properties. Application to several types of systems.

306. **GENERAL THERMODYNAMICS II.** Sem. 1 and 2. Class 3, cr. 3. (6 AE).

Continuation of ME 305. Thermodynamic properties, mixtures, thermochemistry and chemical equilibrium, cycles, introduction to statistical thermodynamics.

308. **THERMOPHYSICS.** Sem. 1 and 2. SS. Class 4, cr. 4. (6 EE). Prerequisite: MA 318.

Energy balances and equations of state or fixed mass systems, properties, second law of thermodynamics, entropy. Introduction to kinetic theory and transport properties and the statistical mechanics of independent particles. Fundamentals of heat transfer by conduction, convection, and radiation.

310. **FLUID MECHANICS.** Sem. 1 and 2. SS. Class 3. Problem 1, Lab. 2, cr. 4. (5 ME 6 AGEN). Prerequisites: MA 262, ESC 206, and ME 200.

Fluid statics, basic laws for systems and control volumes, dimensional analysis, stream function, velocity potential, viscous effects, boundary layer, compressible flow, flow in channels and around submerged bodies.

315. **HEAT AND MASS TRANSFER.** Sem. 1 and 2. SS. Class 3, Lab. 2, cr. 4. (6 AGEN, 6 ME). Prerequisite or corequisite: ME 302 and 310.

Fundamental principles of heat transfer by conduction, convection, and radiation; mass transfer by diffusion and convection. Emphasis on process heat transfer and application to design.

340. **MEASUREMENTS AND COMPUTERS.** Sem. 1 and 2. SS. Class 2, Lab. 3, cr. 3. (5 ME). Prerequisite: MA 262; prerequisite or corequisite: EE 231.

Characterization and behavior of typical measuring systems with emphasis on transfer function and frequency response techniques. Transducers, amplifiers, computing devices, readout devices, and their response to steady and transient phenomena. Introduction to analog computers. Problem preparation and scaling using electronic differential analyzers.

475. **SYSTEM ANALYSIS AND CONTROL.** Sem. 1 and 2. SS. Class 2, Lab. 3, cr. 3. (7 ME). Prerequisites: MA 302 and ME 340.

Principles of automatic control as applied to engineering systems. Solution techniques for linear systems. Control system components and transfer functions. Frequency response techniques for improving system performance. Performance criteria and overall system design requirements.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

500. THERMODYNAMICS. Sem. 1 and 2. SS. Class 3, cr. 3. (Tech. el. ME). Prerequisites: ME 302 and MA 302.

The empirical, physical basis of the laws of thermodynamics. Formulation of the definitions and laws from the postulational approach. Properties and relations between properties in homogeneous and heterogeneous systems. The criteria of equilibrium. Application to a variety of systems and problems; phase and reaction equilibrium.

505. HEAT AND MASS TRANSFER. Sem. 1 and 2. SS. Class 3, cr. 3. (Tech. el. ME, CHE). Prerequisite: ME 315.

Heat conduction and mass diffusion in two and three dimensions; convective heat and mass transfer for internal and external flows including boundary layer and free-stream phenomena; use of analogies between heat, mass, and momentum transport; combined conduction, convection, and radiation heat transfer; combined diffusion and convection mass transfer; applications to design.

509. INTERMEDIATE FLUID MECHANICS. Sem. 1. SS. (in odd numbered years). Class 3, cr. 3. (Tech. el. ME). Prerequisites: ME 310 and MA 302.

Fluid properties, basic laws for a control volume, kinematics of fluid flow, dynamics of frictionless incompressible flow, basic hydrodynamics, equations of motion for viscous flow, viscous flow applications, boundary layer theory, unsteady flow.

510. GAS DYNAMICS. Sem. 2. SS (even numbered years). Class 3, cr. 3. (Tech. el. ME). Prerequisites: ME 310 and MA 302.

Flow of compressible fluids including one-dimensional gas dynamics, isentropic flow, normal and oblique shocks, and diabatic flow. Two-dimensional compressible flow. Two-dimensional compressible flow including irrotational flow, linearized theory and method of characteristics. Shock reflection and interactiton.

550. INTRODUCTION TO MISSILE AND SPACE SYSTEMS DESIGN. Sem. 1 and 2. Class 3, cr. 3. (Tech. el. ME). Prerequisites: MA 302, ME 302, 306, or 307, and ME 310.

Trajectory analysis, fundamental characteristics and design principles pertinent to guided missiles, space vehicles and their propulsion systems. Elements of inertial and noninertial guidance systems as applied to missile and space systems.

597. SELECTED TOPICS IN MECHANICAL ENGINEERING. Sem. 1 and 2. SS. cr. 1-6. Available on arrangement with the head of the school. May be repeated for credit.

NUCLEAR ENGINEERING

Professor Powers in charge, Lafayette

500. NUCLEAR ENGINEERING. Sem. 1 and 2. Class 3, cr. 3. Prerequisite: senior or graduate standing in engineering, or consent of instructor.

An introduction to nuclear reactor principles and engineering applications. Reactor theory; control; energy removal; materials; power reactor systems; propulsion; and other applications.

501. NUCLEAR ENGINEERING PRINCIPLES. Sem. 1. Class 3, cr. 3. Prerequisite: graduate standing in engineering, or consent of instructor.

A first course for graduate students desiring a nuclear engineering sequence. Nuclear structure; nuclear radiations; neutron behavior while slowing down and diffusing; fast and thermal reactor theory; and control.

School of Home Economics

Dean Goble in charge, Lafayette

THE PLAN OF STUDY in home economics is designed to prepare young men and women for professional work in the various areas of the field and at the same time to provide a broad general education which prepares the student to meet the needs for home and community living.

Representative of the areas of concentration are clothing and textiles, foods and nutrition, food management, foods in business, food research, home economics extension, housing, vocational home economics teaching, institutional management, and interior design.

Students interested in preparation for work in the fields mentioned above should enroll in the curriculum listed below.

FRESHMAN YEAR

First Semester

(1) HE 100 (Home Economics Lectures and Discussions)
(3) CHM 111 (General Chemistry)
(3) ENGL 101 (English Composition I)
(3) SOC 100 (Introductory Sociology)
(3) C&T 102 (Clothing I)
(3) Mathematics

(16)
Plus (1) Physical Education (For Women)

Second Semester

(3) CHM 112 (General Chemistry)
(3) ENGL 102 (English Composition II)
(3) PSY 120 (Elementary Psychology)
(3) A&D 105 (Design I)
(3) F&N 205 (Foods I)

(15)
Plus (1) Physical Education (For Women)

SOPHOMORE YEAR

Third Semester

(2) BIOL 201 (Biology of Man)*
(3) ECON 210 (Principles of Economics)
(4) CHM 251 (Organic Chemistry)†
(1) CHM 251L (Organic Chemistry Lab)†
(3) E&FH 226 (Housing the Family I)
(3) ENGL (Literature)

(16)

Fourth Semester

(2) BIOL 203 (Biology of Man)
(3) SPE 114 (Fundamentals of Speech Communication)
(3) PSY 235 (Child Psychology)‡
(3) F&N 303 (Essentials of Nutrition) or F&N 315 (Fundamentals of Nutrition)
(3) Elective to meet general education requirement (under social and behavioral sciences)

(14)

HOME ECONOMICS

UNDERGRADUATE LEVEL

Lower-Division Course

100. **HOME ECONOMICS LECTURES AND DISCUSSIONS.** Sem. 1. Class 1, cr. 1.

General orientation and the study of the professional opportunities in the various areas of home economics. Required of all freshmen in the School of Home Economics.

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* Students planning to follow the dietetics or foods or nutrition research option should register for BIOL 202 in addition to 201.

† Not required for students who expect to follow these options: interior design, nursery-kindergarten, home furnishings, home planning, or home economics teaching (general certification).

‡ Except for students in HE teaching and nursery-kindergarten teaching.

CLOTHING AND TEXTILES

UNDERGRADUATE LEVEL

Lower-Division Course

102. **CLOTHING I.** Sem. 1 and 2. Class 2, Lab. 3, cr. 3.

Aesthetic and economic factors in the selection of clothing designs, fabrics, and colors for individuals; factors associated with fabric handle, drape, and appearance; experimental study of fabric characteristics involved in creating a unified garment; fabric properties in relation to usage.

EQUIPMENT AND FAMILY HOUSING

UNDERGRADUATE LEVEL

Lower-Division Course

226. **HOUSING THE FAMILY I.** Sem. 1 and 2. Class 2, Lab. 2, cr. 3.

Selection of housing and home furnishings for family living.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

525. **ACTIVITY AREA PLANNING.** Sem. 2. SS. Class 1, Lab. 4, cr. 3. Prerequisites: E&FH 327 and 345 or 348, or consent of the head of the department.

Functional and research basis for planning and arranging work and activity areas in the home. Field trips required. Cost of meals borne by student.

FOODS AND NUTRITION

UNDERGRADUATE LEVEL

Lower-Division Course

205. **FOODS I.** Sem. 1 and 2. Class 1, Lab. 4, cr. 3. Prerequisite: CHM 107; prerequisite or corequisite: CHM 108.

Scientific principles and techniques in food preparation.

UNDERGRADUATE LEVEL

Upper-Division Courses

303. **ESSENTIALS OF NUTRITION.** Sem. 1 and 2. Class 3, cr. 3. No prerequisites. Credit not given for both FN 303 and 315.

Basic nutrition and its application in meeting nutritional needs of all ages. Consideration is given to food selection and legislation and community nutrition education programs.

315. **FUNDAMENTALS OF NUTRITION.** Sem. 1 and 2. Class 3, cr. 3. Prerequisites: organic chemistry and physiology. Credit not given for both FN 303 and 315.

Basic principles of nutrition and their application in meeting nutritional needs during the life cycle.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

538. **READINGS IN NUTRITION.** Sem. 1 and 2. SS. in odd-number years. cr. 2 or 3. Prerequisite: F&N 435 or graduate standing.

Survey of recent literature in the field of nutrition.

590. **SPECIAL PROBLEMS IN NUTRITION.** Sem. 1 and 2. SS. Credit and hours to be arranged. Prerequisites: courses approved by the head of the department.

Individual problems dealing with various aspects of nutrition.

School of Humanities, Social Science, And Education

Dean Ogle in charge, Lafayette

THREE BACHELOR'S DEGREES are offered in the School of Humanities, Social Science, and Education: Bachelor of Arts, Bachelor of Science, and Bachelor of Physical Education. All programs leading to these degrees have certain requirements in common:

1. Satisfaction of the minimum scholastic index requirement as established by the faculty;
2. The general University requirements for residence, payment of diploma fee, attendance at commencement exercises, etc. For further details about these requirements, see the *General Information Bulletin.*

BACHELOR OF ARTS AND BACHELOR OF SCIENCE

The program leading to the degree Bachelor of Science is followed by students majoring in audiology and speech sciences or psychology. The program leading to the degree Bachelor of Arts is followed by students majoring in any of the fields of humanities or social sciences, in high school teaching in any of these fields, or by women students preparing to teach physical education.

In addition to the University-wide requirements for the bachelor's degree (minimum scholastic index as established by the faculty, etc.), the requirements for the Bachelor of Arts and Bachelor of Science degrees are:

1. Completion of the required courses listed under General Education Requirements which are designed to insure the broad liberal education of the student;
2. Selection of an area, a concentration, or a major, and the completion of the requirements on file with the dean's representative.
3. Completion of at least 126 semester hours of credit within ten years preceding the date of graduation.

General Education Requirements

About one half of the total program is devoted to the satisfaction of the "core requirements," which have been chosen with a view to broadening each student's background. These requirements for the B.A. and B.S. degrees are:

English Composition (ENGL 101, 102, or 103 or equivalent)	6 hours
Speech (SPE 114)	3 hours
Foreign Language (Courses numbered 101, 102, 203, 204, or proficiency in 204 or higher in one modern foreign language)	12 hours
Literature (Any six hours for which student is qualified, in English or a foreign language)	6 hours
Mathematics (MA 123, 124 or 133, 134, or 153, 154)	6 hours
Natural or Physical Science (A six-hour laboratory sequence in physics, chemistry, or biology)	6 hours
Social and Behavioral Sciences	
(a) history (HIST 200 or 251)	3 hours
(b) sociology or psychology (SOC 100 or PSY 120)	3 hours

(c) political science or economics (POL 101 or ECON 210)	3 hours
(d) two additional courses of three hours each from any two of the above five areas (a through c)	6 hours
Philosophy (PHIL 110, 111, or 150)	3 hours
Art, Music, Theatre (one course chosen from A&D 355, 356, 357; MUS 370, 372, 373, 375; SPE 240; THTR 201, 301, 302)	3 hours
General Studies (GS 435 or 436)	2 hours
	62 hours

CONCENTRATION REQUIREMENTS

There are three patterns of concentration: (1) the *area* (maximum of 46 hours, of which at least 12 are in courses outside the major department); (2) the *concentration* (36 to 46 hours); and (3) the *major* (24 to 35 hours). Each department specifies whether its major must be accompanied by a minor. This major, concentration, or area provides the depth necessary for admission to a graduate school, to meet teacher certification requirements, or for a well-rounded liberal education.

Each student must file his choice of major, area, or concentration with the dean's representative not later than the end of the third semester. He may subsequently change his major, with permission of the dean's representative.

B.A. and B.S. Degrees

AREAS, CONCENTRATIONS, AND MAJORS

AUDIOLOGY AND SPEECH SCIENCES
- Audiology and Speech Sciences
- Speech and Hearing Therapy

CHILD DEVELOPMENT AND FAMILY LIFE
- Human Development

CREATIVE ARTS
- Advertising Design
- Art History
- Fine Arts
- Interior Design
- Music History
- Theatre

ENGLISH
- *American Literature
- Creative Writing
- English Honors
- *English Literature
- Journalism

FOREIGN LANGUAGE
- French
- *German
- Russian
- Spanish

HISTORY
- American Civilization
- *American History
- *European History

LIBRARY SCIENCE

PHILOSOPHY

PHYSICAL EDUCATION, HEALTH, AND RECREATION
- Health and Safety
- Recreation

POLITICAL SCIENCE
- Comparative Government
- International Relations
- *Political Science
- Political Theory

PRE-LAW

***PSYCHOLOGY**

***SOCIOLOGY**

SPEECH
- Speech Communication
- *Speech, General
- Radio-Television

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* Denotes majors available in their entirety at the Calumet Campus.

MINORS

Audiology and Speech Sciences
Economics
French
German
Health and Safety
History
Journalism
Library Science
Literature
Mathematics
Music History and Theory
Philosophy
Political Science
Psychology
Radio and Television
Recreation
Russian
Sociology
Spanish
Speech Communication
Speech Communication, History of
Speech, General
Theatre

PROGRAMS FOR TEACHER CERTIFICATION

Teaching Area Majors

Arts and Crafts
Physical Education and Health (Women)

Teaching Majors

- Arts and Crafts
- *Elementary Education
- *Foreign Language
- *Library
- Nursery-Kindergarten
- *Physical Education
- Special Education (Teaching the Mentally Retarded)
- English Honors
- *English
- Foreign Language
  - French
  - *German
  - Russian
  - Spanish
- Health and Safety
- Physical Education and Health (Women)
- Recreation
- School Library and Audiovisual Services
- *Social Studies—two of:
  - Economics
  - Government
  - Sociology
  - U. S. History
  - World History
- *Speech
- Speech and Hearing Therapy

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* Denotes majors available in their entirety at the Calumet Campus.

Teaching Minors

- Arts and Crafts
- Biology
- Chemistry
- English
- Foreign Language
  - French
  - German
  - Russian
  - Spanish
- General Science
- Health and Safety
- Mathematics
- Physical Education (Men)
- Physical Education (Women)
- Physics
- Psychology
- Recreation
- School Library and Audiovisual Services
- Social Studies—one of:
  - Economics
  - Government
  - Sociology
  - U. S. History
  - World History
- Speech

In teacher preparation, Purdue University has been accredited by the National Commission on Accreditation of Teacher Education, by the North Central Association of Secondary Schools and Colleges, and by the Indiana State Department of Public Instruction. Detailed requirements for any of the areas, majors, or minors may be obtained from the student counseling office of the school. A student who has an educational objective not covered in the list of areas, majors, or minors should consult his academic adviser.

PLANS OF STUDY

Each student's program for the four years will be based on one of several plans of study, appropriately modified to fit his concentration requirements and his exemptions, i.e., proficiency in modern language, ENGL 103, etc.

Students who plan to teach in high school will use the plan of study for the major subject-matter field of the teaching certificate for which they expect to qualify.

BACHELOR OF ARTS—GENERAL PROGRAM*

FRESHMAN YEAR

First Semester

(3) ENGL 101 (English Composition I) or ENGL 103 (Composition and Literature)
(3) MA 123 (Elementary Concepts of Mathematics I)
(3) Modern Language
(3) Social Science
(3) Course in Major

(15)

Second Semester

(3) SPE 114 (Fundamentals Speech Communication)
(3) MA 124 (Elementary Concepts of Mathematics II)
(3) ENGL 102 (English Composition II)
(3) Modern Language
(3) Course in Major

(15)

ELEMENTARY EDUCATION

FRESHMAN YEAR

First Semester

(3) ENGL 101 (English Composition I)
or ENGL 103 (Composition and Literature)
(4) MA 133 (Mathematics for Elementary Teachers I)
(3) BIOL 205 (Biology for Elementary School Teachers)
(3) HIST 251 (American History to 1865)
(1) PEW 101 (Introduction to Human Movement)
(1) PEW 103 (Personal Hygiene)
(3) Modern Language
(18)

Second Semester

(3) SPE 114 (Fundamentals of Speech Communication)
(4) MA 134 (Mathematics for Elementary Teachers II)
(3) BIOL 206 (Biology for Elementary School Teachers)
(3) HIST 252 (United States and Its Place in World Affairs)
(1) PEW 102 (Introduction to Human Movement II)
(3) Modern Language
(17)

SOPHOMORE YEAR

Third Semester

(3) ENGL 230 (Introduction to Literature)
(1) ED 249 (Directed Observation in the Elementary School)
(3) PSY 120 (Elementary Psychology)
(3) Social Science
(3) Physical Science
(3) Modern Language
(3) Second Major
(19)

Fourth Semester

(3) ED 285 (Educational Psychology)
(3) ENGL 102 (English Composition II)
(3) Social Science
(3) Physical Science
(3) Modern Language
(3) Second Major
(18)

After 30 hours of college credit, an elementary education student must comply with the following requirements:

1. Have at least a 4.0 graduation index.
2. Pass a speech and hearing test.
3. Complete 20 clock hours of leadership experience.
4. Apply for admission to Teacher Education.

BACHELOR OF PHYSICAL EDUCATION

FRESHMAN YEAR

First Semester

(3) ENGL 101 (English Composition I)
(3) SOC 100 (Introductory Sociology)
(3) PEMN 103 (Physical Activities)
(2) PEMN 105 (Orientation and History of Physical Education)
(3) POL 101 (Introduction to Government)
(1) PEMN 158 (Beginning Golf)
(1) ENGL 185 (Developmental Reading)

(16)

Second Semester

(3) SPE 114 (Fundamentals of Speech Communication)
(2) PEMN 104 (Physical Activities)
(2) PEMN 204 (Physical Education Rhythmic Activities)
(3) POL 103 (Major European Governments)
(3) ENGL 102 (English Composition II)
(3) Elective

(16)

Option A—Coaching and Teaching

SOPHOMORE YEAR

Third Semester

(2) BIOL 201 (Biology of Man)
(1) BIOL 202 (Laboratory in Human Biology)
(3) MA 123 (Elementary Concepts of Mathematics I)
(3) RECR 301 (Foundations of Recreation)
(1) PEMN 165 (Tennis, Badminton, and Squash)
(2) PEMN 205 (Curricular Activities)
(3) PSY 120 (Elementary Psychology)

(15)

Fourth Semester

(2) BIOL 203 (Biology of Man)
(1) BIOL 204 (Laboratory in Human Biology)
(3) MA 124 (Elementary Concepts of Mathematics II)
(3) PEMN 219 (Personal and Community Hygiene)
(2) PEMN 208 (Elementary Physical Education)
(2) PEMN 316 (Coaching Football and Baseball)
(3) Elective

(16)

Option B—Nonteaching Major

SOPHOMORE YEAR

Third Semester

Same as Third Semester of Option A

Fourth Semester

(2) BIOL 203 (Biology of Man)
(1) BIOL 204 (Laboratory in Human Biology)
(3) MA 124 (Elementary Concepts of Mathematics II)
(3) PEMN 219 (Personal and Community Hygiene)
(2) PEMN 208 (Elementary Physical Education)
(5) Electives (area of specialty)

(16)

Option C—Prephysical Therapy

Third Semester

(3) BIOL 103 (Principles of Biology)
(3) ENGL 230, 231 or 238 (Literature)
(3) CHM 111 (General Chemistry)
(2) PEMN 205 (Curriculur Activities)
(3) MA 123 (Elementary Concepts of Mathematics I)
(3) PSY 120 (Elementary Psychology)

(17)

Fourth Semester

(3) BIOL 104 (Principles of Biology)
(3) PEMN 219 (Personal and Community Hygiene)
(3) CHM 112 (General Chemistry)
(3) HIST 200 (Early Civilization) or 251 (American History to 1865)
(2) PEMN 208 (Elementary Physical Education)
(3) MA 124 (Elementary Concepts of Mathematics II)

(17)

CREATIVE ARTS

Professor Forth in charge, Lafayette

Professor Horn, Chairman, Calumet Section

The areas of creative arts and speech are combined on the Calumet Campus. Students interested in the various phases of the creative arts and the arts and sciences of speech communication have a wider range of curricular options than the title of the department indicates. Programs are available (1) to meet requirements for the several concentrations, majors, or minors offered within the Department of Speech and Creative Arts at the Calumet Campus, or (2) to fulfill those requirements leading to licenses to teach speech (along with any of the possible minors) in public or private schools. These studies are intended to help students prepare themselves for those fields of endeavor in which communication plays an important part (i.e., theatre, painting, music, and other applied arts, sales, public service, personnel management, law) or for teaching careers in public or private schools.

Art and Design

UNDERGRADUATE LEVEL

Lower-Division Courses

103. **BASIC DESIGN.** Class 1, Studio 5, cr. 3.

Investigations of problems inherent in line, mass, space, color, and texture.

105. **DESIGN I.** Class 1, Studio 5, cr. 3.

Two dimensional design; an introduction to the elements of design with experiments in the creation of forms and shapes and their organization in a two dimensional field.

106. **DESIGN II.** Class 1, Studio 5, cr. 3.

Three dimensional design; an introduction to the organization of forms and volumes in space with experiments in the use of various materials and simple tools.

113. **BASIC DRAWING.** Class 1, Studio 5, cr. 3.

An introduction to drawing and sketching as a means of communication of ideas.

114. **DRAWING II.** Class 1, Studio 5, cr. 3. Prerequisite: A&D 113, or consent of instructor.

Continuation of A&D 113; emphasis is given to the exploration of a variety of media and the structuring of pictorial space.

200. **PAINTING I.** Class 1, Studio 5, cr. 3. Prerequisites: A&D 105, and A&D 214 or consent of instructor.

Course designed to stimulate a beginning understanding of the philosophies, the use of materials, and the practices leading to the art of painting.

201. ART FOR ELEMENTARY SCHOOL TEACHERS. Class 2, Studio 4, cr. 4.

Art theory and experiences and curriculum theory and materials preparatory to instruction of elementary school children.

259. PAINTING II. Class 1, Studio 5, cr. 3. Prerequisite: A&D 200 or consent of instructor.

A continuation of A&D 200.

UNDERGRADUATE LEVEL
Upper-Division Courses

355. ART APPRECIATION. Class 3, cr. 3. Not open to freshmen.

Understanding and appreciation of the problems overcome by mankind in the origins and growth of art. Satisfies the aesthetics requirement of the School of Humanities, Social Science, and Education.

365. PAINTING III. Class 1, Studio 5, cr. 3. Prerequisite: A&D 259 or consent of instructor.

A studio course concentrating on the introduction of attitudes designed to help the individual student to a greater consciousness of his personal creative needs and to help him develop personal means of expression within the art of painting.

Music

UNDERGRADUATE LEVEL
Upper-Division Courses

360. MUSIC THEORY I. Class 3, cr. 3.

A study of the basic tonal, rhythmic, and formal structure of music: aural, visual, and written practice in rhythm, melody, harmony, texture, and small forms. This course includes melodic, rhythmic, and harmonic dictation; sight-reading; the fundamentals of harmony and composition. (The student should have a basic reading knowledge of staff notation.)

361. MUSIC THEORY II. Class 3, cr. 3. Prerequisite: GS 360, or permission.

A survey of the evolution of tonal music with emphasis upon the development of contrapuntal and harmonic stylistic devices. The course includes a continuation of melodic, rhythmic, and harmonic dictation as well as sight-singing and keyboard harmony.

370. MUSIC APPRECIATION. Class 3, cr. 3.

An introduction to the understanding of music. How to listen to its materials. A study of the media, forms, styles, and composers through recorded, live, and film media. Methods used in the structure of music as well as the aesthetic values present in music are also emphasized. Satisfies the aesthetics requirement of the School of Humanities, Social Science, and Education.

375. SPECIAL GENRE IN MUSIC. Class 3, cr. 3. Prerequisite: MUS 370, 371, 372, or 373.

A survey course in some specific genre in music, such as the symphony, the opera, chamber music, contemporary music, etc., in which the repertoire is presented through analysis of formal structure, and in context with its historical-stylistic background. May be repeated for credit with permission of the instructor. Satisfies the aesthetics requirement of the School of Humanities, Social Science, and Education.

Theatre

UNDERGRADUATE LEVEL
Lower-Division Courses

130. ACTING I. Lab. 6, cr. 2 or Class 1, Lab. 3, ch. 2.

Training and exercise in the basic elements of acting and the use of the stage. Study of historical and theoretical backgrounds of acting and of different types of plays and staging.

136. REHEARSAL AND PERFORMANCE I. Lab. 3 or 6, cr. 1 or 2.

(May be repeated once for credit. Maximum number of credits for any combination of THTR 136, 168, 336, and 368 is four.)

Study and practice of rehearsal techniques and of stage performance. Students will be assigned to acting and stage management duties in the experimental and major stage productions.

168. TECHNICAL THEATRE PRODUCTION I. Lab. 3 or 6, cr. 1 or 2.

(May be repeated once for credit. Maximum number of credits for any combination of THTR 136, 168, 336, and 368 is four.)

The study and application of technical theatre practice in scene construction, painting, lighting, costuming, and stage management. Students will be assigned to experimental and major stage productions.

201. THEATRE APPRECIATION. Sem. 1 and 2. SS. Class 2, Lab. 2, cr. 3. (Formerly THTR 250.)

Understanding and appreciation of the theatre's role in the modern world, including a survey of dramatic structure and analysis, and the functions of the actor, director, designer, and critic related to current stage productions.

Laboratory work includes attendance and discussion of the dramatic presentations on campus. Satisfies the aesthetics requirement of the School of Humanities, Social Science, and Education.

230. **ACTING II.** Sem. 2. Class 1, Lab. 3, cr. 2 or Class 0, Lab. 6, cr. 2. (Formerly THTR 262.) Prerequisite: THTR 110, 120, 130, and/or consent of instructor.

Continued training and exercise in the basic elements of acting, including prose dialogue and sight reading; beginning work in role and script analysis; rehearsal in simple scenes. Advanced exercises in believability, observation and awareness, concentration, imagination, and the sense-memory-recall leading to characterization. Professor Kildahl and Staff.

255. **ELEMENTS OF STAGECRAFT.** Class 1, Lab. 4, Cr. 3.

Fundamentals of scenery construction and painting, stage lighting and properties, costuming, and theatrical make-up.

UNDERGRADUATE LEVEL

Upper-Division Courses

336. **REHEARSAL AND PERFORMANCE II.** Lab. 3 or 6, cr. 1 or 2.

(May be repeated once for credit. Maximum number of credits for any combination of THTR 166, 168, 366, and 368 is four.)

The study and practice of rehearsal techniques and stage performance. Students will be assigned to acting and stage management duties in experimental and major stage productions.

340. **INTRODUCTION TO PLAY PRODUCTION AND DIRECTION.** Class 2, Lab. 2, cr. 3.

A basic study of directing and administration of play production in the high school: audience analysis, casting, directing procedures, rehearsal and performance techniques, promotion and publicity, interdepartmental cooperation, and the school dramatic organization. Laboratory application of directing practice.

368. **TECHNICAL THEATRE PRODUCTION II.** Lab. 3 or 6, cr. 1 or 2.

(May be repeated once for credit. Maximum number of credits for any combination of THTR 166, 168, 366, and 368 is four.)

The study and application of technical theatre practice in scene construction, painting, lighting, costuming and stage management. Students will be assigned to experimental and major stage productions.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

530. **ADVANCED ACTING.** Sem. 1. Class 2, Lab. 2, cr. 3. (Formerly THTR 562.) Prerequisite: THTR 130, 230, and/or consent of instructor.

Advanced work in role and script analysis and character development, including study and practice in difficult prose and verse dialogue reading; intensive study of internal and external aspects of characterization, interaction, and ensemble playing; rehearsal in complex scenes; and participation in one play.

531. **ACTING STYLES.** Sem. 2. Class 2, Lab. 2, cr. 3. (Formerly THTR 563.) Prerequisite: THTR 530 and/or consent of instructor.

Continued study of character analysis, role development, and dialogue reading. Practice of period acting styles in scenes selected from the dramatic literature of the classical Greek and subsequent eras.

534. **CHILDREN'S CREATIVE DRAMATICS.** Class 2, Lab. 2, cr. 3.

Principles and methods of developing original dramatization with children and of creating plays from children's literature; use of the activity as part of the elementary school curriculum.

540. **ADVANCED DRAMATICS DIRECTING.** Class 2, Lab. 2, cr. 3. Prerequisite: THTR 201 or equivalent.

Application of principles of directing to the various types of drama; laboratory practice in directing plays for experimental production.

541. **DRAMATIC PRODUCTION IN SCHOOL AND COMMUNITY.** Class 1, Lab. 2 or 4, cr. 2 or 3.

The theory and practice of planning and producing plays. Selection, analysis, casting, blocking, rehearsal schedules, characterization, polishing, and performance procedures. Laboratory projects in movement, picturization, and directed scenes.

560. **ADVANCED STAGE DESIGN.** Class 1. Lab. 4, cr. 3. Prerequisite: THTR 360 or consent of instructor.

Advanced study of the principles of design and their application to specific staging problems.

580. **HISTORY OF THE THEATRE I.** Class 3, cr. 3. Prerequisite: THTR 201.

The study of the theatre in the Western world from its primitive origins, through the Greek, Roman, Medieval, and the Renaissance periods.

581. **HISTORY OF THE THEATRE II.** Sem. 2. Class 3, cr. 3. (Formerly THTR 564.)

A study of the major periods in the development of the theatre from 1640 to 1900: French Neo-classicism. English Restoration, melodrama, sentimental and bourgeois theatre of the 18th century, German and French Romanticism, and the 19th century theatre of Germany, France, Scandinavia, and England.

590. **DIRECTED STUDY OF SPECIAL THEATRE PROBLEMS.** Sem. 1 and 2. SS. cr. 1 to 3. Admission by consent of instructor. (May be repeated for credit.)

An individualized and intensive study of any aspect of theatre required by the student's plan of study.

EDUCATION

Professor Hicks in charge, Lafayette

Professor Trimble, chairman, Calumet Section

The Department of Education provides a curriculum which will enable students to fulfill the requirements, in accordance with state regulations, for a provisional certificate in either elementary or secondary education. The courses offered as a part of the teacher education curriculum have been carefully structured to provide the scope and sequence necessary to establish a solid professional foundation both philosophically and technically. All courses necessary in most teaching fields may be taken on the Calumet Campus.

The program is designed in such a manner that general education requirements consisting of about one-half of the total program are met in the earlier part of the student's studies. In the later portion, increasing amounts of time are devoted to the specific subjects to be taught. Professional courses tend to be concentrated into the last two years and culminate in a supervised teaching experience for which arrangements are made with public schools in the area.

In selecting the particular type of teacher education program which best fits his needs, the student may either choose elementary education or from among several patterns of concentration for secondary education. These include: (1) a single teaching area major, (2) a single teaching minor, (3) two or more teaching minors (for junior high school teaching), or (4) a combination of teaching area majors or teaching majors with teaching minors. Each of these requires a different number of hours of preparation. Because of the complexity of choice, it is important that the student meet with an academic counselor to make careful plans for the program in teacher education.

The Department of Education maintains a placement service. Registration is freely extended to help graduating seniors find attractive positions.

249. **DIRECTED OBSERVATION IN THE ELEMENTARY SCHOOL.** Lab. 3, cr. 1.

Directed observation for one-half day per week in elementary school classrooms. Individual and group conferences and written records are required.

285. **EDUCATIONAL PSYCHOLOGY.** Class 3, cr. 3. (4 H, IED, PEM, op. 4 S, 6 A). Prerequisite: PSY 120.

An introduction to the application of psychology to education, with particular emphasis on human development and learning.

304. **PRINCIPLES OF TEACHING.** Class 2 or 3, cr. 2 or 3. Prerequisite: PSY 120.

Fundamental principles underlying classroom instruction and management, including consideration of pupil behavior, counseling, and remedial techniques.

320. **TEACHING THE LANGUAGE ARTS IN THE ELEMENTARY SCHOOL.*** Class 3, Lab. 0, cr. 3.

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* Prerequisite Admission to the Elementary Education Curriculum.

Materials and methods in the language arts—reading, oral and written language, listening, spelling, and handwriting—in the elementary school.

321. **TEACHING ARITHMETIC IN THE ELEMENTARY SCHOOL.*** Class 3, cr. 3.

Materials and methods used in teaching arithmetic at various grade levels in the elementary school.

322. **TEACHING SOCIAL STUDIES IN THE ELEMENTARY SCHOOL.*** Class 3, cr. 3.

Curriculum principles and objectives, organization of materials, instruction techniques, and evaluation procedures.

323. **TEACHING OF SCIENCE IN THE ELEMENTARY SCHOOL CURRICULUM.*** Class 3, cr. 3.

Provides experiences in developing skills for teaching science as well as the understanding of appropriate subject matter; includes evaluation techniques and procedures.

324. **MUSIC FOR ELEMENTARY SCHOOL TEACHERS.*** Class 3, cr. 3.

Basic musical experience, including elementary music skills. Principles and procedures of teaching music. Relationship of music to other subject areas. Music materials.

326. **TEACHING READING IN THE ELEMENTARY SCHOOL.***Class 3, cr. 3.

Methods and materials for teaching reading in the elementary school.

385. **CASE STUDIES OF ELEMENTARY SCHOOL CHILDREN.*** Cr. 2 or 3. Prerequisites: admittance to elementary education and ED 285, or consent of instructor.

402. **THE TEACHING OF BIOLOGY IN SECONDARY SCHOOLS.** Sem. 1 and 2. Class 2, cr. 2.

405. **THE TEACHING OF ENGLISH IN SECONDARY SCHOOLS.** Sem. 1. Class 2, cr. 2.

406. **THE TEACHING OF SOCIAL STUDIES IN SECONDARY SCHOOLS.** Sem. 1. Class 2, cr. 2.

408. **THE TEACHING OF MATHEMATICS IN SECONDARY SCHOOLS.** Sem. 1 and 2. Class 2, cr. 2.

410. **THE TEACHING OF MODERN FOREIGN LANGUAGES.** Class 3, cr. 3.

418. **THE TEACHING OF SPEECH IN SECONDARY SCHOOLS.** Sem. 1 and 2. Class 2, cr. 2.

424. **SUPERVISED TEACHING OF SECONDARY SCHOOL SUBJECTS.** Sem. 1. cr. 6. Prerequisite or corequisite: a methods course.

Observation and teaching of some academic subject or physical education in secondary schools under the supervision of the critic teachers in charge of the high school classes and supervisors from the University.

425. **THE TEACHING OF MODERN FOREIGN LANGUAGES IN THE ELEMENTARY SCHOOL.** Sem. 1. Class 3, cr. 3. Should precede the professional semester.

430. **SUPERVISED TEACHING IN THE ELEMENTARY SCHOOL.*** Cr. 8.

Teaching full-time in elementary school classrooms under the supervision of the elementary education staff and public school teachers. Emphasis on preparation and presentation of major teaching units and full classroom responsibility.

478. **INTRODUCTION TO LIBRARIES AND MATERIALS CENTERS.** Class 2, cr. 2.

Development and functions of the modern library and the instructional materials center from the teacher's point of view.

480. **SOCIAL AND PHILOSOPHICAL FOUNDATIONS OF EDUCATION.*** Class 3, cr. 3.

Introduction to the social forces and philosophical ideas which surround education, including community structure, American ideals and conflicts in relation to the schools, comparison of contemporary communities and their schools, and the interaction between education and social progress.

481. **TRENDS AND ISSUES IN ELEMENTARY EDUCATION.*** Class 3, cr. 3.

The organization of learning experiences to deal effectively with individual differences and varied curriculum patterns. Consideration of recent trends and research—programmed learning, team teaching, departmentalization, self-contained and ungraded classroom, core program, and use of special professional services.

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* Prerequisite Admission to the Elementary Education curriculum.

485. THE AMERICAN SCHOOL SYSTEM. Class 3, cr. 3.

An introduction to contemporary education in this nation with particular emphasis on the organization, administration and operation of public schools in respect to purposes, programs, problems, and trends.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

510. PRINCIPLES AND PROBLEMS OF VOCATIONAL AND EDUCATIONAL GUIDANCE. Class 3, cr. 3. Prerequisite: 12 hours of psychology and education or equivalent professional training.

The development of vocational and educational guidance in the home, school, industry, and service organizations; consideration of the principles and present practices in such guidance.

511. GUIDANCE IN THE ELEMENTARY SCHOOL. Class 3, cr. 3.

Guidance problems arising in the elementary school, and principles and techniques applicable to their solution. Role of the classroom teacher in providing services to pupils and parents.

512. SELECTION AND USE OF OCCUPATIONAL INFORMATION. Class 3, cr. 3.

A systematic study of occupations, with emphasis upon the selection and use of materials and techniques essential to appropriate vocational choices, placement, and adjustment.

523. INTRODUCTION TO MEASUREMENT AND EVALUATION. Class 2, Lab. 2, cr. 3.

An introduction to the basic concepts and principles of measurement and evaluating, including: elementary statistics; principles of test construction; survey of standardized tests.

526. READING AND THE JUNIOR HIGH SCHOOL. Class 3, cr. 3. Prerequisite: 12 hours of education and psychology.

A course designed for teachers and prospective teachers in subject matter areas of the junior high school. It is not in the sequence for reading specialists. Survey of techniques and objectives of reading instruction in the schools with special attention to the opportunities and obligations to teach reading within the content areas. Teaching experience helpful, but not required.

EDUC 529. MENTAL HYGIENE IN EDUCATION. Sem. 2. SS. Class 3, cr. 3. Prerequisites: PSY 120 and EDUC 285.

Principles of mental health and emotional adjustment in relation to family, peers, school, and total environment with emphasis upon case materials as a vehicle for identifying and understanding the symptoms and dynamics of both emotional adjustment and maladjustment and emphasis on building a constructive climate for the optimum development of youths and adults.

530. ADVANCED EDUCATIONAL PSYCHOLOGY. Class 3, cr. 3. Prerequisites: PSY 120 and ED 285.

Principles of learning evaluated in relation to current methods of instruction and to the result from research in education and psychology.

549. THE JUNIOR HIGH SCHOOL. Sem. 2. SS. Class 3, cr. 3.

Development, population, organization, purposes, and methods of junior high schools, with major emphasis on adolescent psychology and on the curriculum.

547. EDUCATIONAL FACILITIES PLANNING. SS. cr. 1 to 3.

Adapted to the needs of school principals and superintendents; architectural practice in building programs, school building layout, equipment, maintenance, operation, and sanitation.

536. FOUNDATIONS FOR REMEDIAL READING. Class 3, cr. 3. Prerequisite: 12 hours of education and psychology.

First course in sequence leading to certification as a reading specialist, but may be elected by others needing basic information in reading. Considers history, psychology and physiology, and current practices in developmental and remedial reading.

570. AUDIO-VISUAL AIDS FOR TEACHERS. Cr. 2 or 3. Prerequisite: 12 hours of education and psychology.

Sources, selection, and effective use of audio-visual aids and preparation of audio-visual materials.

571. PREPARATION OF INSTRUCTIONAL MATERIALS. Class 1, Lab. 4, cr. 3.

Preparation and creation of a variety of instructional materials for use by instructional materials specialists, teachers, librarians, and A-V coordinators in educational situations. Laboratory practice is provided in production of these materials.

578. REFERENCE MATERIALS. Class 2, cr. 2. Prerequisite: five hours of education and psychology.

Evaluation, selection, and use of basic library materials.

579. AUDIO-VISUAL SERVICES IN LIBRARIES AND MATERIALS CENTERS. Class 2, cr. 2. Must be preceded by five hours of education and psychology.

Types, functions, and organization of audio-visual materials, equipment, and services in libraries and materials centers.

580. **LIBRARY MATERIALS FOR CHILDREN.** Class 3, cr. 3. Prerequisite: five hours of education and psychology.

The selection and use of library materials for children.

581. **LIBRARY MATERIALS FOR YOUNG PEOPLE.** Class 3, cr. 3. Must be preceded by five hours of education and psychology.

Selection and use of library materials for young people.

583. **ADMINISTRATION OF SCHOOL LIBRARIES AND MATERIALS CENTERS.*** Cr. 3. Prerequisite: 8 hours of education and psychology.

Organization and administration of school libraries and materials centers, and practicum in library and audio-visual services.

590. **INDIVIDUAL RESEARCH PROBLEMS.** cr. 1-6. Prerequisite: six hours of psychology and six hours of education, or equivalent professional training and approval by the department.

Opportunities for students to study particular problems under the guidance of a member of the staff. This plan of individualized instruction may be used in any field of education or vocational education. Does not include thesis work.

591. **EDUCATIONAL PROBLEMS OF TEACHERS.** cr. 1-4.

Primarily for experienced teachers desiring credit from special workshops or individual study. Topics of individual study will deal with problems which arise from the professional work of classroom teachers.

GRADUATE LEVEL

600. **HISTORY AND PHILOSOPHY OF EDUCATION.** Class 3, cr. 3. Prerequisite: 12 hours in education.

Consideration of the major ideas, trends, and movements in the development of American education.

610. **TECHNIQUES OF COUNSELING.** Class 3, cr. 3. Prerequisite: ED 210 and PSY 500 and 505.

Selection and use of counseling techniques; observation and practice in the use of these techniques and in the interpretation of the results.

612. **ORGANIZATION AND ADMINISTRATION OF GUIDANCE.** Class 2 or 3. cr. 2 or 3.

627. **SECONDARY SCHOOL CURRICULUM.** cr. 2 or 3.

Objectives, organization, and administration of the secondary school curriculum.

628. **STUDENT ACTIVITIES IN THE SECONDARY SCHOOL.** Cr. 3.

Philosophy, organization, and administration of student activities in junior and senior high schools.

630. **SECONDARY SCHOOL ADMINISTRATION.** Class 3, cr. 3. Open to certified teachers, or by arrangement with instructor.

Problems confronting a school principal in the administration and management of a secondary school, including school records and statistics.

631. **ELEMENTARY SCHOOL ADMINISTRATION AND SUPERVISION.** Class 3, cr. 3. Must be preceded by 12 hours in education and psychology.

Functions of leadership, personnel, school and class organization, grading, promotion, work with parents, and techniques of supervision.

632. **SCHOOL PRINCIPALSHIP.** Class 3, cr. 3. Prerequisite: ED 285, 304, and 502.

Public school organization and administration, including school records and statistics.

634. **BUSINESS MANAGEMENT AND EDUCATION.** Class 3, cr. 3.

Nature and importance of the budget in school preparation; its preparation and adoption, control, and execution; nature and purpose of accounting, and its relation to budgeting; special accounting problems and preparation of an actual school budget.

635. **LEGAL ASPECTS.** Cr. 1 to 3.

636. **SUPERVISION INSTRUCTION.** Class 3, cr. 3. Must be preceded by ED 285, 304, and 502.

Concepts and techniques of supervision with emphasis on sound personnel policies and procedures.

639. **CLINIC FOR EDUCATIONAL LEADERS.** cr. 1-6.

671. **RESEARCH PROCEDURES IN EDUCATION.** Cr. 3. Prerequisite: 12 hours of education and psychology.

Development of a philosophy of educational research and consideration of the methods for the selection and evaluation of techniques used in experimental studies in education. Techniques discussed are methods to control variables, sampling procedures, data collection procedures, statistical procedures, and drawing of inferences and conclusions from data.

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* Consent of instructor required.

679. **ELEMENTARY SCHOOL CURRICULUM.** Class 3, cr. 3. Prerequisite: 12 hours in education and psychology.

Needs of children and society; modern programs; procedures for developing a curriculum, including ways to improve the present offerings of a school.

680. **REVIEW OF RESEARCH IN ELEMENTARY EDUCATION.** Class 3, cr. 3. Prerequisite ED 430 or equivalent.

A study of research important generally to elementary education. Critical analysis of research in one area of special interest.

ENGLISH

Professor Adler in charge, Lafayette

Professor Tuckey, chairman, Calumet Section

The English section offers a wide range of courses in writing, language, and literature which, in conjunction with the general education requirements of the University and of the School of Humanities, Social Science, and Education, lead to the Bachelor of Arts degree. In addition, the section offers a selected series of graduate-level English courses, some of which may be elected by advanced undergraduates as part of their bachelor's degree studies.

Although the English major frequently applies his collegiate study to a career in education or editorial work, the program itself exists to sharpen his powers of analysis, heighten his communicative abilities, and broaden his cultural awareness. At his discretion the English major may further widen his cultural scope or introduce a measure of specialization by tailoring his program to include a minor in another field of the humanities, in social science or in education, or even in such disciplines as physical and biological science or home economics. The goal of the program is preparation for life and the professions through a liberal education.

101. **ENGLISH COMPOSITION I.** Class 2, cr. 2. (Freshmen) Prerequisite for all courses in English except ENGL 2, 103, and 185.

Emphasis on the organization of the expository theme. Directed writing of themes based on personal experience, on the relationship between experience and language, and on the relationship between experience and ideas.

102. **ENGLISH COMPOSITION II.** Class 2, cr. 2. Not open to students who have earned a grade of C or higher in ENGL 103.

The second half of the basic composition sequence. Emphasis on the logical and rhetorical problems involved in writing discursive essays. Directed writing of themes based largely on reading of discursive prose and imaginative literature. Normally to be taken immediately following ENGL 101 in the freshman year.

A student who has received a grade of A in ENGL 101 may, with the approval of the head of his school, substitute for ENGL 102 an elective course in English.

103. **COMPOSITION AND LITERATURE.** Class 3, cr. 3. (Freshmen).

An introduction to composition and literature in which students will study the elements of good writing, various approaches to fiction, poetry, and drama, and basic literary terms.

For freshmen provisionally excused from ENGL 101. Required of all English majors, who, if they are not originally assigned to it, qualify by making a C or higher in English 101.

Students taking ENGL 103 as their first English course who receive grade C or higher will be excused from ENGL 102 and given credit for ENGL 101; those who receive grade D must take ENGL 101 or 102, depending upon the recommendation of the ENGL 103 instructor; those who fail ENGL 103 must take both ENGL 101 and 102.

185. **DEVELOPMENTAL READING.** Lab. 2, cr. 1.

Purpose: to increase reading efficiency by improving comprehension and by developing the motor skills involved in reading speed. Motivates reading interest through use of films and pacers.

230. INTRODUCTION TO LITERATURE. Class 3, cr. 3. Not open to students with credit for ENGL 238.

Reading and discussion on major works in English, American, and continental literature to develop an understanding of style, form, and ideas characteristic of great works. Emphasis on types of narrative literature.

231. INTRODUCTION TO LITERATURE. Class 3, cr. 3.

Reading and discussion of major works in English, American, and continental literature to develop an understanding of style, form, and ideas characteristic of great works. Emphasis on various types of literature.

235. INTRODUCTION TO THE DRAMA. Class 3, cr. 3.

Reading and discussion of a number of plays, most of them modern, aimed at an appreciation of the drama as literature and as entertainment.

238. INTRODUCTION TO FICTION. Class 3, cr. 3. Not open to students with credit for ENGL 230.

Reading and discussion of selected short stories and seven novels, to promote awareness, understanding, and appreciation of the range, values, techniques, and meanings of reputable modern fiction.

240. INTRODUCTION TO THE LITERATURE OF ENGLAND: FROM THE BEGINNINGS TO SWIFT AND POPE. Class 3, cr. 3.

A survey with emphasis on the study of selected texts from the major writers, this course aims at both competence in literary analysis and awareness of the relation between each writer and his times. Required of all students majoring in English.

241. INTRODUCTION TO THE LITERATURE OF ENGLAND: FROM THE RISE OF ROMANTICISM TO THE TWENTIETH CENTURY. Class 3, cr. 3.

A continuation of ENGL 240, this course carries the same study from the mid-eighteenth to the twentieth century.

Required of all students majoring in literature.

250. GREAT AMERICAN BOOKS. Class 3, cr. 3.

Seven books, such as *The Scarlet Letter, Moby Dick,* and *Walden,* read and discussed as to their literary qualities and their cultural significance.

304. ADVANCED COMPOSITION. Class 3, cr. 3.

Designed for students who wish additional training in composition beyond the basic requirements. Extensive practice in the writing of mature expository, critical, and argumentative prose. (This course satisfies the Indiana certification requirements for 3 hrs. of advanced composition.)

310. NEWS WRITING. Class 1, Lab. 4, cr. 3, or Class 3, cr. 3.

Style, news values, and story construction in newspaper writing. Extensive practice in writing various principal types of news stories for the American press. (Typing ability is highly desirable.)

318. NEWS EDITING. Class 3, cr. 3.

Techniques of news editing, copyreading, headline writing; principles of newspaper makeup and typography; survey of printing production.

327. INTRODUCTION TO THE LINGUISTIC STUDY OF ENGLISH. Class 3, cr. 3.

This course and 328 will satisfy the English language requirement for teacher certification.

History and rationale of the scientific study of English and a survey of the development of English sounds, inflections, syntactical patterns, and vocabulary.

328. THE STRUCTURE OF AMERICAN ENGLISH. Class 3, cr. 3.

Application of structural analysis to American English in light of constructive criticism offered by traditional, generative-transformational, and other grammars. Relevance of recent study to the practical teaching of English.

350. A SURVEY OF AMERICAN LITERATURE TO WHITMAN. Class 3, cr. 3. Should be preceded by ENGL 240 and 241. Not open to sudents who have credit for ENGL 250.

Selected writings of all major authors, such as Franklin, Emerson, Hawthorne, and some minor writers are read and discussed as to their individual qualities, the forces exerted on them, and their expression of the American mind and character. Required of all students majoring in American literature.

351. A SURVEY OF AMERICAN LITERATURE FROM WHITMAN TO THE PRESENT. SS. Class 3, cr. 3. Should be preceded by ENGL 240 and 241. Not open to students who have credit for ENGL 250.

Continuation of ENGL 350. Required of all students majoring in American literature.

421. BUSINESS WRITING: ENGINEERING APPLICATIONS. Class 3, cr. 3.
Study of the types of letters and reports in engineering. Practice in their preparation. Consideration of the qualities found in engineering papers.

442. SIX PLAYS BY SHAKESPEARE. Class 3, cr. 3.
Shakespeare's dramatic craftsmanship, poetry, humor, characterization, psychology, and modern pertinence illustrated in representative, tragedies, comedies, and history plays. One play studied intensively; others read more rapidly. Required of all students majoring in literature.

455. MAIN CURRENTS OF AMERICAN THOUGHT. Class 3, cr. 3.
A survey of dominant ideas and intellectual trends in America from 1607 to the present as revealed through American literature and as related to American life and culture.

456. AMERICAN HUMOR. Class 3, cr. 3.
Humorous writings of the nineteenth and twentieth centuries are studied as to form and technique and also as a reflection of American life. Special emphasis on Mark Twain.

471. THE ENGLISH NOVEL. Class 3, cr. 3.
Studies in the historical development of the English novel, with reading and discussion of representative works of the eighteenth and nineteenth centuries.

472. THE AMERICAN NOVEL. Class 3, cr. 3.
Reading and discussion on representative American novels from Hawthorne to Faulkner, emphasizing major trends in purpose, content, and technique. Supplementary lectures on background materials.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

526. THE DEVELOPMENT OF STANDARD ENGLISH. Class 3, cr. 3.
Consideration of all aspects of the language objectively. Through inductive and descriptive techniques, explanation of present-day English, stressing historical continuity. Variations in usage studied realistically. Recommended for prospective teachers and others interested in English language problems.

527. GENERAL LINGUISTIC SCIENCE. Sem. 2. Class 3, cr. 3.
Principles of comparative language structures. Application of linguistic science to classification, scientific communications, and language learning. Relations between language and writing systems.

531. THE ENGLISH NOVEL THROUGH 1800. Sem. 1. Class 3, cr. 3.
A study of such novelists as Defoe, Richardson, Fielding, Smollett, Sterne, and Jane Austen.

532. THE ENGLISH NOVEL IN THE NINETEENTH CENTURY. Class 3, cr. 3.
A survey of fiction up to about 1880, including such novelists as Scott, Dickens, Thackery, the Brontës, Eliot, and Meredith.

533. TUDOR LITERATURE. Sem. 1. Class 3, cr. 3.
Nondramatic literature of the English Renaissance up to 1603, particularly the Elizabethan. Representative selections in both prose and verse are studied, with special attention to Spenser, Sidney, and Shakespeare.

535. RESTORATION AND EARLY EIGHTEENTH CENTURY LITERATURE. Class 3, cr. 3.
A survey of the nondramatic literature from 1660 to 1744, from Clarendon through Thompson. Emphasizes Bunyan, Dryden, Pope, Swift.

536. LATER EIGHTEENTH-CENTURY LITERATURE. Class 3, cr. 3.
A survey of the nondramatic literature from 1744 to 1798, from Young through Gibbon and Cowper. Excludes the novel. Emphasizes Johnson and his circle and Gray and his circle.

541. CHAUCER. Class 3, cr. 3.
A study of Chaucer as a literary artist in *The Canterbury Tales* and a few other poems. Some attention to social, literary, and linguistic backgrounds.

542. SHAKESPEARE'S COMEDIES AND TRAGI-COMEDIES. Class 3, cr. 3.
A study of the development of Shakespeare's comic art from the early comedies through the later comedies and tragicomedies. Ten to twelve plays will be read.

543. SHAKESPEARE'S TRAGEDIES AND HISTORY PLAYS. Class 3, cr. 3.
A study of the early and mature tragedies, the English histories, and the Roman plays. Ten to twelve plays will be read.

544. MILTON. Class 3, cr. 3.
A study of Milton's poetry and prose, with particular emphasis on *Paradise Lost,* and some attention to the social, political, and literary background.

547. **THE ROMANTIC MOVEMENT IN ENGLISH LITERATURE.** Class 3, cr. 3.
Principal writers of the Romantic Movement (Burns to Keats), emphasizing Wordsworth; relation of the historical background to the thought and feeling of the writers concerned.

548. **VICTORIAN LITERATURE.** Class 3, cr. 3.
A survey of English poetry and prose from about 1832 to 1880.

549. **ENGLISH LITERATURE 1880-1920.** Class 3, cr. 3.
A survey of transitional developments (outside the drama) in such writers as Pater, Wilde, Butler, Gissing, Moore, and Wells and such movements as aestheticism, decadence, naturalism, and impressionism.

553. **COLONIAL AND EARLY AMERICAN LITERATURE.** Class 3, cr. 3.
A survey of American literature from the beginning to about 1820, concluding with such writers as Brackenridge, Brown, and Tyler.

554. **THE AMERICAN RENAISSANCE.** Class 3, cr. 3.
A survey of American literature from about 1820 to 1855, concluding with Melville.

556. **NINETEENTH-CENTURY AMERICAN FICTION.** Class 3, cr. 3.
Surveys the development of American fiction from its beginnings. Though representative works of all periods will be read, emphasis will be given to Hawthorne, Melville, Twain, and James.

558. **THE RISE OF REALISM IN AMERICAN LITERATURE.** Class 3, cr. 3.
A survey of American literature from about 1855 to 1900, beginning with Whitman and ending with James and the early naturalists.

578. **MODERN AMERICAN FICTION.** Class 3, cr. 3.
Critical study of twentieth-century novels and short stories, including works by such writers as James, Faulkner, and Hemingway.

579. **MODERN BRITISH FICTION.** Class 3, cr. 3.
Critical study of twentieth-century novels and short stories by such writers as Conrad, Lawrence, and Forster. Special attention is given to James Joyce's *Ulysses.*

590. **DIRECTED WRITING.** SS. Sem. 1 and 2, cr. 1 to 3. Admission by consent of instructor.
Writing—creative, popularly technical, biographical, historical, philosophical—on subjects of the student's choice. Individual conferences only. No class meetings. May be repeated for credit.

GRADUATE LEVEL

601. **METHODS OF LITERARY STUDY.** Class 3, cr. 3.
Introduction to the tools and techniques of literary research, including the study of methods of bibliography, varying critical approaches, and the writing of scholarly papers.

624. **MIDDLE ENGLISH.** Sem. 2. Class 3, cr. 3.
A study of selected readings from the literature of about 1100 to about 1500. Emphasis on the language.

655. **MAIN CURRENTS OF AMERICAN THOUGHT.** Class 3, cr. 3.
Dominant ideas and intellectual trends in America from 1607 to the present as revealed through American literature and as related to American life and culture.

657. **SEMINAR IN AMERICAN LITERATURE BEFORE 1900.** Class 3, cr. 3.
Intensive study of the writings of not more than three authors. Relation of the authors' lives to their times and to their works, and critical problems of various sorts.

687. **DEVELOPMENTAL READING FOR TEACHERS.** Class 2, Lab. 2, cr. 3.
Techniques for improving reading skills.
Introduction to laboratory method. Research and reading in the field, and interning in the laboratories. Recommended for prospective teachers of reading.

691. **SEMINAR IN THE ENGLISH LANGUAGE ARTS.** Class 3, cr. 3.
Problems in the teaching of English: composition, reading, literature, the English language. Attention to audio-visual aids, techniques of testing, course planning, extracurricular activities, library functions.

693. **DIRECTED READING.** SS., cr. 1-3. Admission by consent of instructor.
Directs the reading of students with special interests. Guides students in profitable reading in subjects of their own choice. Individual conferences—no class meetings. May be repeated for credit.

698. **RESEARCH.** M.A. Thesis.

HISTORY

Professor Forster in charge, Lafayette
Professor Trusty, chairman, Calumet Section

The Calumet Campus offers the Bachelor of Arts degree in American and European history as well as the courses necessary to be certified as a high school teacher of United States or world history within the social studies teaching major.

While the course of study is designed to provide the student with a broad cultural background, students majoring in history who complete their education at the baccalaureate level find employment in business, industry, and government service along with other graduates of liberal arts programs. The study of history can also be used to meet the requirements for entrance into a law school. Those who continue their study of history and attain advanced degrees can become college teachers.

A major in either American or European history requires 45 hours of courses in history, 56 hours of core requirements, and 25 hours of elective courses. Endorsements to teach history on the secondary level range from 12 to 21 hours.

200. **EARLY CIVILIZATION.** Class 3, cr. 3.

A survey of European development from earliest times through the sixteenth century, this course is designed to meet the needs of the beginning student in European and world history.

201. **DEVELOPMENT OF MODERN CIVILIZATION.** Class 3, cr. 3.

A continuation of HIST 200, this course traces the expansion of Europe into the Americas, Africa, and Asia. The French Revolution, nationalism, and the development of Western European states from the sixteenth century to the present are studied.

251. **AMERICAN HISTORY TO 1865.** Class 3, cr. 3.

A study of the development of American political, economic, and social institutions from the early explorations and colonial settlements to the conclusion of the Civil War.

252. **THE UNITED STATES AND ITS PLACE IN WORLD AFFAIRS.** Class 3, cr. 3.

A study of the growth of the United States from the period of the Reconstruction to the present. The new industrialism, agrarian problems, territorial expansion, the two world wars, depression, the New Deal, and similar topics are analyzed.

428. **ENGLISH HISTORY TO 1688.** Class 3, cr. 3. Prerequisite: HIST 200 or 201.

This course is designed to survey the growth and development of English society from its beginning through the seventeenth century. Emphasis is put upon those institutions and events that influenced the establishment of the English legal system. Professor Pringle.

429. **ENGLISH HISTORY SINCE 1688.** Class 3, cr. 3. Prerequisite: HIST 201.

A continuation of HIST 521. Emphasis is placed upon Great Britain as a world and imperial power. Attention is given particularly to the industrial revolution, the growth and achievements of democratic institutions, and the role Britain has played in Western civilization in recent times. Professor Pringle.

467. **TWENTIETH CENTURY AMERICAN HISTORY.** Sem. 1, Class 3, cr. 3. Prerequisite: HIST 251 and 252.

A survey of twentieth century American history, covering major political and economic developments and related intellectual movements. A parallel consideration of foreign affairs traces the emergence of America as a world power and the effects of her new status on the Western Hemisphere, Europe, and Asia. Dean Sander.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

506. **EUROPE, 1815 TO 1870.** Class 3, cr. 3. Prerequisite: HIST 201.

An historical study in the restoration, reaction, and revolution following the congress of Vienna; the rise of nationalism culminating in German and Italian unification, and reorganization of Austria; rise and fall of the French Second Republic and Empire; and the struggle of conservatism, liberalism and socialism. Professor Pringle.

507. EUROPE, 1870 TO 1919. Class 3, cr. 3. Prerequisite: HIST 201.

An examination of the rapid growth of industry, science, and technology, and general economic change and growth in western Europe. The history of European power politics culminating in World War I with emphasis on imperialism, colonialism, militarism, extreme nationalism will be explored. Social-economic problems attendant upon the foregoing will be defined. Professor Pringle.

508. HISTORY OF EUROPE SINCE 1920. Class 3, cr. 3. Prerequisite: HIST 201.

A survey of post World War I adjustments and the inter-war period; the causes, campaigns, and diplomacy of World War II, and a survey of each of the major countries since 1945. Professor Kelleher.

523. MODERN GERMANY. Class 3, cr. 3. Prerequisite: HIST 201.

A survey of the growth of the modern German state, with emphasis upon the political, economic, and social development in the 19th and 20th centuries. Professor Kelleher.

560. AMERICAN COLONIAL HISTORY. Class 3, cr. 3. Prerequisite: HIST 201 or 251.

An investigation of the foundation of the American colonies, their place in the British imperial structure, and the eventual conflict of imperial exigencies with colonial self-interest and national feeling. Professor Trusty.

561. THE REVOLUTIONARY ERA. 1763-1800. Sem. 2. Class 3, cr. 3. Must be preceded by HIST 251.

An anlysis of the origin, nature, and consequence of the American Revolution; of the achievements and difficulties of the new nation under the Articles of Confederation; of the drafting and adoption of the Constitution; and of the initial political, economic, and social progress of the United States under the Federalists. Professor Trusty.

563. THE NATIONAL PERIOD IN AMERICA, 1787-1850. Sem. 1 or 2. Class 3, cr. 3. Prerequisite: HIST 251.

The national period in American history from the framing of the Constitution to the avoidance of secession by the Compromise of 1850. Emphasis on the trends of nationalism and sectionalism, and their effect upon political administration, the economy, and the national character. Professor Trusty.

565. THE CIVIL WAR AND RECONSTRUCTION (1850 TO 1877). Class 3, cr. 3. Prerequisites: HIST 251 and 252, or consent of instructor.

A survey of the American Civil War and Reconstruction, covering the intense sectional conflict of the 1850's; the military, social, economic, and political aspects of the war; and the political and economic reconstruction which followed. Dean Sander.

567. RECENT AMERICAN HISTORY. Sem. 1, Class 3, cr. 3. Prerequisites: HIST 251 and 252.

A study of twentieth century American history into the depression thirties. Domestic political and social developments will be traced from 1914 to 1939, while diplomatic and military events will be covered from the early twentieth century to 1933. Particular attention will thus be given to the First World War and the Great Depression. Dean Sander.

568. CONTEMPORARY AMERICA. Sem. 2, Class 3, cr. 3. Prerequisites: HIST 251 and 252.

An examination of American history since the 1930's. Political, economic, and social developments will be covered for the period since 1939, while diplomatic and military events will be reviewed since 1933. Dean Sander.

571. U. S., LATIN AMERICAN RELATIONS. Class 3, cr. 3. Prerequisite: HIST 200 and 201, or 251 and 252.

Institutions, recources, political and economic conditions in Latin-American countries. Professor VanOrman.

573. HISTORY OF THE SOUTH. Class 3, cr. 3. Prerequisite: HIST 251.

Geographic, economic, cultural, social, and political aspects of the South. The significance of such figures as Jefferson, Jackson, Calhoun, Jefferson Davis, and Woodrow Wilson. The emphasis is on the evolution of the intellectual climate.

574. HISTORY OF THE AMERICAN WEST. Class 3, cr. 3. Prerequisites: HIST 251, 252.

A study of the American frontier. Characteristics and problems of pioneer life;

causes and effects of the westward movement of our people. Professor VanOrman.

584. **SOCIAL HISTORY OF THE UNITED STATES.** Class 3, cr. 3. Prerequisites: HIST 251 and 252.

A survey of the social and cultural development of the American people since the late eighteenth century. Professor Lerner.

586. **DIPLOMATIC HISTORY OF THE UNITED STATES.** Class 3, cr. 3. Prerequisites: HIST 200 and 201, or HIST 251 and 252.

The history of American foreign affairs since the Colonial Period viewed in the perspective of their relationship to international politics in modern times. Changes in United States policy as a reflection of changing power status and objectives are traced. The general issues of interests and ideals and the clash between national goals and international organization are examined. Dean Sander.

589. **HISTORY OF RELIGION IN AMERICA.** Sem. 2. Class 3, cr. 3. Must be preceded by HIST 251 and 252.

An historical examination from Colonial beginnings to the present, of American religions and their role in the social, political, and economic life of the nation, including a survey of the speculative theories, the institutional forms, and the artistic and emotional expressions of religion which have developed in the United States. Professor Lerner.

592. **EARLY AMERICAN INTELLECTUAL HISTORY.** Class 3, cr. 3. Prerequisite: HIST 251.

A survey of American political, economic, philosophical and religious thought beginning with the European backgrounds of American Puritanism and concluding with the rise of Darwinian naturalism. Professor Lerner.

593. **TWENTIETH CENTURY AMERICAN INTELLECTUAL HISTORY.** Class 3, cr. Prerequisite: HIST 252.

A survey of the origins and development of modern American thought. Early American religious and philosophical traditions. Darwinian evolution and evolutionary naturalism, pragmatism, and the main intellectual currents of the 1920's and the 1930's are considered. Dean Sander.

595. **METHODS IN THE STUDY OF HISTORY.** Class 3, cr. 3. Prerequisites: HIST 200 and 201 or 251 and 252.

This course is designed to train history majors in the fundamentals of historical research and writing. It is required of all history majors and graduate students. Professor Trusty.

597. **THE AMERICAN NEGRO.** Class 3, cr. 3. Prerequisite: HIST 251 and 252, or consent of instructor.

A survey of the history of Negroes in the United States from their African background to the present. Emphasis will be placed upon the changing economic, social, and political status of Negroes in the United States, and their contributions to American society. Professor Trusty.

MODERN LANGUAGES

Professor Walther in charge, Lafayette

The Department of Modern Languages, Calumet Campus Section offers courses in four modern foreign languages and their respective literatures: French, German, Russian, and Spanish. Upon successful completion of these courses, students have a unique opportunity to seek employment with such organizations as the United States Foreign Service, the United Nations Secretariat; with the major industrial firms having overseas operations (export and import). In addition, professional training is available for foreign language teachers on the elementary or secondary levels. To complement and intensify these programs, the department has inaugurated three overseas study centers at the Vienna Institute of Technology and the Universities of Grenoble and Madrid.

The Department of Modern Languages, Calumet Campus Section also partakes in the service course curriculum providing students with courses in order to fulfill their foreign language requirements. The following schools of the University are being served by the program: the School of Engineering (6 to 12 hours elective), the School of Humanities, Social Science, and Education (12 hours required), the School of Science (12 hours required) and the Graduate School (two semesters).

101. **FIRST COURSE IN FRENCH.** Class 3. Lab. 1, cr. 3. For beginners only.
Unless recommended by the head of the school in which the student is registered, a student may not apply toward graduation the credit for FR 101 without satisfactorily completing a more advanced course in French.

102. **SECOND COURSE IN FRENCH.** Class 3, Lab. 1, cr. 3. Prerequisite: FR 101.
Continuation of FR 101.

203. **THIRD COURSE IN FRENCH.** Class 3, cr. 3. (op. or el.). Prerequisite: FR 102.
Readings from works of modern and contemporary French writers; practice in speaking and writing French.

204. **FOURTH COURSE IN FRENCH.** Class 3, cr. 3. (op. or el.). Prerequisite: FR 203.
Continuation of FR 203.

UNDERGRADUATE LEVEL

Upper-Division Courses

305. **INTRODUCTION TO FRENCH LITERATURE I.** Class 3, cr. 3. Prerequisite: FR 204.
Introduction to the periods of French literature from the beginning through the eighteenth century. Reading and discussion of representative works. The rudiments of literary criticism.

306. **INTRODUCTION TO FRENCH LITERATURE II.** Class 3, cr. 3. Prerequisite: FR 204.
Introduction to the periods of French literature from the late eighteenth century to the present time. Reading and discussion of representative works. The rudiments of literary criticism.

360. **FRENCH CONVERSATION.** Sem. 1 and 2. Class 3, Lab. 2, cr. 4. Prerequisite: FR 204.
Intensive practice in conversational French. Pattern practice, preparation and delivery of dialogues, and topical talks.

461. **FRENCH CONVERSATION AND COMPOSITION.** Class 3, cr. 3. Prerequisite: FR 204.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

550. **FRENCH CIVILIZATION.** Class 3, cr. 3.
The study of modern French life with special emphasis on the customs and daily life of the people. Lectures in French.

552. **FRENCH CULTURE.** Sem. 2. Class 3, cr. 3.
Development of the cultural life of the French people as reflected in architecture, art, history, literature, music, and philosophy. Lectures in French.

590. **DIRECTED READING IN FRENCH.** cr. 1 to 4. Prerequisite: consent of the chairman for French. (May be repeated for credit.)

COURSES FOR GRADUATE READING KNOWLEDGE

601. **FIRST COURSE FOR GRADUATE STUDENTS.** Class 4, cr. 3. No prerequisite.

603. **SECOND COURSE FOR GRADUATE STUDENTS.** Class 4, cr. 3. (For those in the physical sciences, mathematics, and engineering.)

605. **SECOND COURSE FOR GRADUATE STUDENTS.** Class 4, cr. 3. (For those in the humanities and social sciences.)

German

101. **FIRST COURSE IN GERMAN.** Class 3, Lab. 1, cr. 3. For beginners only.
Unless recommended by the head of the school in which the student is registered, a student may not apply toward graduation the credit for GER 101 without satisfactorily completing a more advanced course in German.

102. **SECOND COURSE IN GERMAN.** Class 3, Lab. 1, cr. 3. Prerequisite: GER 101.
Continuation of GER 101.

203. **THIRD COURSE IN GERMAN.** Class 3, cr. 3. Prerequisite: GER 102.
Readings from the works of nineteenth century and contemporary German writers; practice in speaking and writing German.

204. FOURTH COURSE IN GERMAN. Class 3, cr. 3. Prerequisite: GER 203.

Continuation of GER 203.

244. FOURTH COURSE IN SCIENTIFIC GERMAN. Class 3, cr. 3. Prerequisite: GER 203 or equivalent. Credit will not be given for both GER 204 and 244.

UNDERGRADUATE LEVEL

Upper-Division Courses

305. INTRODUCTION TO GERMAN LITERATURE I. Class 3, cr. 3. Prerequisite: GER 204.

Introduction to the periods in German literature from the eighteenth century to the present. Reading and discussion of representative works. The rudiments of literary criticism.

306. INTRODUCTION TO GERMAN LITERATURE II. Class 3, cr. 3. Prerequisite: GER 204.

Introduction to the periods in German literature from the eighteenth century to the present. Reading and discussion of representative works. The rudiments of literary criticism.

360. GERMAN CONVERSATION. Class 3, Lab. 2, cr. 4. Prerequisite: GER 204.

Intensive practice in conversational German. Pattern practice, preparation and delivery of dialogues, and topical talks.

461. GERMAN CONVERSATION AND COMPOSITION. Class 3, cr. 3. Prerequisite: GER 204.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

519. GERMAN CLASSICISM. Class 3, cr. 3. Prerequisite: GER 306.

The study of the classical period in German literature as revealed in the works of Goethe and Schiller.

520. GERMAN ROMANTICISM. Class 3, cr. 3. Prerequisite: GER 306.

A study of the rise and degeneration of the Romantic ideal in German literature. Particular attention is paid to the aesthetics, literary criticism, and the revival of a national heritage.

550. GERMAN CIVILIZATION. Class 3, cr. 3.

The study of modern German life with special emphasis on the daily life and customs of the people.

552. GERMAN CULTURE. Sem. 2. Class 3, cr. 3.

The development of the cultural life in German-speaking lands as reflected in architecture, art, history, literature, music, and philosophy. Lectures in German.

564. GERMAN LINGUISTICS. Sem. 2. Class 3, cr. 3. Prerequisite: GER 461.

Important principles of practical phonetics, phonemics, and the rudiments of phonology. Practical work in pronunciation and intonation.

565. ADVANCED GERMAN CONVERSATION. Class 3, cr. 3. Prerequisite: GER 461.

Additional practice in speaking and understanding German. Extensive listening (outside of class) to recordings of natives from various parts in the German speaking world. Talks based on this material given in class.

590. DIRECTED READING IN GERMAN. cr. 1 to 4. Prerequisite: consent of the chairman for German. (May be repeated for credit.)

COURSES FOR GRADUATE READING KNOWLEDGE

601. FIRST COURSE FOR GRADUATE STUDENTS. Class 4, cr. 3. No prerequisite.

603. SECOND COURSE FOR GRADUATE STUDENTS. Class 4, cr. 3. (For those in the physical sciences, mathematics, and engineering.)

605. SECOND COURSE FOR GRADUATE STUDENTS. Class 4, cr. 3. (For those in the humanities and social sciences.)

Russian

101. FIRST COURSE IN STANDARD RUSSIAN. Class 3, Lab. 1, cr. 3. For beginners only.

Unless recommended by the head of the school in which the student is registered, a student may not apply toward graduation the credit for RUSS 101 without satisfactorily completing a more advanced course in Russian.

102. SECOND COURSE IN STANDARD RUSSIAN. Class 3, Lab. 1, cr. 3. Prerequisite: RUSS 101.

Continuation of RUSS 101.

203. THIRD COURSE IN STANDARD RUSSIAN. Class 3, cr. 3. Prerequisite: RUSS 102.

204. FOURTH COURSE IN STANDARD RUSSIAN. Class 3, cr. 3. Prerequisite: RUSS 203.

Continuation of RUSS 203.

UNDERGRADUATE LEVEL

Upper-Division Courses

305. INTRODUCTION TO RUSSIAN LITERATURE I. Class 3, cr. 3. Prerequisite: RUSS 204.

Introduction to the periods of Russian literature from the beginning of the middle of the nineteenth century. Reading and discussion of representative works. The rudiments of literary criticism.

306. INTRODUCTION TO RUSSIAN LITERATURE II. Class 3, cr. 3. Prerequisite: RUSS 204.

Introduction to the periods in Russian literature from the middle of the nineteenth century to the present. Reading and discussion of representative works. The rudiments of literary criticism.

360. RUSSIAN CONVERSATION. Sem. 1. Class 3, Lab. 2, cr. 4. Prerequisite: RUSS 204.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

590. DIRECTED READING IN RUSSIAN. Cr. 1 to 4. Prerequisite: consent of the chairman for Russian. (May be repeated for credit.)

Spanish

101. FIRST COURSE IN SPANISH. Class 3, Lab. 1, cr. 3.

For students who have had no previous work in Spanish.

102. SECOND COURSE IN SPANISH. Class 3, Lab. 1, cr. 3. Prerequisite: SPAN 101.

203. THIRD COURSE IN SPANISH. Class 3, cr. 3. Prerequisite: SPAN 102.

Readings from the works of nineteenth century and contemporary Spanish writers; practice in speaking and writing Spanish.

204. FOURTH COURSE IN SPANISH (READING). Class 3, cr. 3. Prerequisite: SPAN 203.

Primary emphasis on reading, but some practice in speaking.

305. INTRODUCTION TO SPANISH LITERATURE I. Class 3, cr. 3. Prerequisite: SPAN 204 or 264.

Introduction to the periods in Spanish literature from the beginning to the eighteenth century. Reading and discussion of representative works. The rudiments of literary criticism.

306. INTRODUCTION TO SPANISH LITERATURE II. Class 3, cr. 3. Prerequisite: SPAN 204 or 264.

Introduction to the periods in Spanish literature from the eighteenth century to the present. Reading and discussion of representative works. The rudiments of literary criticism.

461. SPANISH CONVERSATION AND COMPOSITION. Class 3, cr. 3. Prerequisite: SPAN 204 or 264.

552. SPANISH CULTURE. Class 3, cr. 3.

The development of the cultural life of the Spanish people, as reflected in the geography, history, music, art, and architecture of Spain. Lectures in Spanish.

565. ADVANCED SPANISH CONVERSATION. Class 3, cr. 3. Prerequisite: SPAN 461.

The study of phonology, phonemics, and phonetics, as aids to an understanding of the development and present status of the language of the Spanish-speaking world. Practical work in pronunciation and intonation.

590. DIRECTED READING IN SPANISH. Cr. 1 to 4. Prerquisite: consent of the chairman for Spanish. (May be repeated for credit.)

PHILOSOPHY

Professor Parker in charge, Lafayette

110. INTRODUCTION TO PHILOSOPHY. Class 3, cr. 3.

The basic problems and types of philosophy, with special emphasis upon the problem of knowledge and nature of reality.

Satisfies the philosophy requirement of the School of Humanities, Social Science, and Education.

111. ETHICS. Class 3, cr. 3.

A study of the nature of moral value and obligation. Topics such as the following will be considered: different conceptions of the good life and standards of right conduct; the relation of nonmoral and moral goodness; determinism, free will, and the problem of moral responsibility; the political and social dimensions of ethics; the principles and methods of moral judgment. Readings will be drawn both from contemporary sources and from the works of such philosophers as Plato, Aristotle, Aquinas, Butler, Hume, Kant, and J. S. Mill. Satisfies the philosophy requirement of the School of Humanities, Social Science, and Education.

150. PRINCIPLES OF LOGIC. Class 3, cr. 3.

A study of the principles and methods employed in the logical appraisal of arguments. Topics such as the following will be considered: semantic principles and problems; informal fallacies; syllogistic logic; truth-functional logic; the logic of quantification; and inductive logic. Satisfies the philosophy requirement of the School of Humanities, Social Science, and Education.

201. ANCIENT PHILOSOPHY. Class 3, cr. 3.

A survey of the principal schools and figures in the history of philosophy from the early Greeks through William of Ockham. Plato, Aristotle, St. Augustine, and St. Thomas Aquinas receive the greatest emphasis.

203. HISTORY OF MODERN PHILOSOPHY. Class 3, cr. 3.

Readings in, lectures on, and discussions about the major and minor philosophical figures from the Renaissance through Kant. This includes fairly intensive study of the works of Descartes, Spinoza, Leibnitz, Locke, Berkeley, Hume, and Kant. Contemporary nonphilosophical figures such as Newton and Calvin are also considered.

206. PHILOSOPHY OF RELIGION. Class 3, cr. 3.

The nature and origin of religion. A critical examination of the idea of God, the nature of evil, immortality, and worship.

240. SOCIAL PHILOSOPHY. Class 3, cr. 3.

A study of the dominant types of social thought from Plato to John Dewey.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

400. NINETEENTH CENTURY PHILOSOPHY. Class 3, cr. 3. Prerequisite: PHIL 110.

A study of the major movements and directions of nineteenth century philosophy, including such men as Hegel, Comte, Mach, Schopenhauer, Nietzsche, Mill, Royce, and Peirce.

590. DIRECTED READING IN PHILOSOPHY. Cr. 1 to 3. Prerequisites: six hours of philosophy, plus basic work in area to be investigated. (May be repeated for credit).

A reading course directed by the instructor in whose particular field of specialization the content of the reading falls. Approval of each reading project must be secured from the department.

PHYSICAL EDUCATION FOR MEN

Professor Mackey in charge, Lafayette

103. TEAM ACTIVITIES. Class 1, Lab. 4, cr. 2. (PEM majors and minors).

Theory and skill techniques in soccer, speedball, calisthenics, and gymnastics.

104. GYMNASTICS. Class 1, Lab. 4, cr. 2. (PEM majors and minors).

Theory and skill techniques in apparatus, calisthenics, and games.

105. PHYSICAL EDUCATION: ORIENTATION AND HISTORY. Class 2, cr. 2. (PEM majors and minors.)

An introduction to physical education which deals with historical development and current trends in this and related fields.

114. ACTIVITIES FOR FITNESS. Class 1, Lab. 3, cr. 2.

A course in physical education designed to improve physical fitness through practice and activity. Elective, but designed primarily for freshmen. Not open to majors and minors in physical education. PEM 114 and 114L must be taken as a single course.

115. ACTIVITIES FOR FITNESS. Class 1, cr. 2.

A course in physical education designed to improve physical fitness through practice and activity. Elective, but designed primarily for freshmen. Not open to majors and minors in physical education. PEM 115 and 115L must be taken as a single course. No prerequisite.

115L. ACTIVITIES FOR FITNESS. Lab. 3, cr. 0.

Laboratory which must accompany PEM 115.

153. BEGINNING SWIMMING. Lab. 3, cr. 1.

154. INTERMEDIATE SWIMMING. Lab. 3, cr. 1.

155. ADVANCED SWIMMING AND LIFESAVING. Lab. 3, cr. 1.

156. TEACHING AND COACHING TECHNIQUES OF WATER ACTIVITIES. Lab. 3, cr. 1. (Includes Red Cross Instruction course.)

158. **BEGINNING GOLF.** Lab. 3, cr. 1. (cl.).

165. **TENNIS, BADMINTON, AND SQUASH.** Lab. 3, cr. 1.

204. **PHYSICAL EDUCATION RHYTHMIC ACTIVITIES.** Class 1, Lab. 2, cr. 2 (4 PEM, el. S).

Theory and skill techniques in group games, dancing, and other social activities.

205. **PHYSICAL EDUCATION CURRICULAR ACTIVITIES.** Class 1, Lab. 4, cr. 2. (PEM majors and minors.)

Theory and skill techniques in touch-flag football, archery, wrestling, and games.

307. **THE COACHING OF BASKETBALL.** Lab. 3, cr. 1.

308. **THE COACHING OF TRACK AND FIELD.** Lab. 3, cr. 1.

309. **THE COACHING OF BASEBALL.** Lab. 3, cr. 1.

314. **PREVENTION AND TREATMENT OF ATHLETIC INJURIES.** Sem. 2. Lab. 4, cr. 2.

316. **THE COACHING OF FOOTBALL.** Lab. 3, cr. 1.

Recreation Leadership

301. **FOUNDATIONS OF RECREATION.** Class 3, cr. 3.

Designed to develop a philosophy of recreation in leisure and identify the principles of recreation and the many organizations functioning in our leisure.

PHYSICAL EDUCATION FOR WOMEN

Professor Clifton in charge, Lafayette

101. **INTRODUCTION TO HUMAN MOVEMENT I.** Class 1, Lab. 2, cr. 1.

An interpretation of certain affective and effective variables associated with movement behavior.

102. **INTRODUCTION TO HUMAN MOVEMENT II.** Class 1, Lab. 2, cr. 1. Prerequisite: PEW 101.

103. **PERSONAL HYGIENE.** Class 1, cr. 1. Required for one semester of all freshman women and entering sophomores who do not have credit for an equivalent course.

Orientation to health problems in college.

UNDERGRADUATE LEVEL
Upper-Division Courses

217. **PHYSICAL EDUCATION IN THE ELEMENTARY SCHOOL.** Class 1, Lab. 4, cr. 3.

Current conceptions of elementary school physical education, with a particular emphasis on curriculum implementation.

HEALTH AND SAFETY

Professor Mackey in charge, Lafayette

UNDERGRADUATE LEVEL
Lower-Division Courses

219. **PERSONAL AND COMMUNITY HYGIENE.** Class 3, cr. 3. (el. HU).

Basic principles and their realization through educational and administrative procedures in public schools. Professor Veenker.

UNDERGRADUATE LEVEL
Upper-Division Courses

380. **FIRST AID.** SS. Class 1, Lab. 2, cr. 2. For three credits see PEW 380. Professors Annarino and Kahms.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

508. **SURVEY OF SAFETY EDUCATION.** SS. Class 3, cr. 3.

An introduction to the problems, materials, and methods of safety education for teachers of all grade levels and subjects.

561. **DRIVER EDUCATION.** Class 2, Lab. 2, cr. 3; or Class 2, Lab. 4, cr. 4.

Subject matter and theory of teaching driver education. Laboratory periods are devoted to behind-the-wheel teaching practice in a dual-control car.

POLITICAL SCIENCE

Professor Hale in charge, Lafayette

Professor Trusty, chairman, Calumet Section

Political science is that branch of social science which studies man's efforts to govern himself, to create governments and states, and to control his social destiny. The baccalaureate in political science is not designed to make one a professional political scientist, but to provide a broad cultural background with particular stress on the descriptive institutional approach. Graduates, frequently with additional training, find employment in such fields as law, teaching, business and industry, research and writing, and government service.

Undergraduates majoring in political science take a basic set of courses designed to give them a broad survey of the discipline and a basic understanding of its most important areas: American government, modern European governments, international relations, political theory, and public administration. In addition to the B.A. in political science, the Calumet Campus offers all of the courses necessary for the government option as part of the social studies teaching major.

101. AMERICAN GOVERNMENT AND POLITICS. Class 3, cr. 3.

A study of the nature of democratic government, the U. S. Constitution, federalism, civil rights, political dynamics, the presidency, Congress, and the judiciary.

103. MAJOR EUROPEAN GOVERNMENTS. Class 3, cr. 3.

Introductory survey of major European governments, including mainly Great Britain, France, Germany, and the Soviet Union, with special attention to historical, cultural, and constitutional developments, the organization and ideologies of political parties, and current political problems.

230. INTRODUCTION TO INTERNATIONAL RELATIONS. Class 3, cr. 3. (el.).

Introductory survey of the underlying forces in international relations, the foreign policies of the great powers, and agencies of control and cooperation.

350. POLITICAL THEORY CONCEPTS. Class 3, cr. 3. No prerequisites.

An analysis of the most important concepts found in the writings of outstanding political theorists from the time of the Greeks through the end of the Middle Ages with attention paid to writings of the Reformation period. An examination of two systems of political thought in the western political tradition: the Classical and the Christian. The ideas of the theorists are studied in the light of the society and institutions of their time.

351. INTRODUCTION TO POLITICAL THEORY: SCHOOLS OF POLITICAL THOUGHT. Class 3, cr. 3. No prerequisites. Students taking *both* 350 and 351 should take 350 *first.*

An analysis of continental and British political thought in the sixteenth through the nineteenth centuries with some attention paid to twentieth-century developments.

370. INTRODUCTION TO COMPARATIVE STATE POLITICS. Class 3, cr. 3.

An introduction to the structure and process of state government, including the legal and political relationship between state and local units of government.

380. PUBLIC ADMINISTRATION: NATIONAL EXECUTIVE AND ADMINISTRATION. Class 3, cr. 3.

Organization, functions, and principles of public administratiton, and its relationship to other branches of the government.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

429. CONTEMPORARY POLITICAL PROBLEMS. Sem. 1. Class 3, cr. 3. Prerequisite: POL 101 or 301.

Contemporary political problems in the United States affecting the interpretation of democracy, human rights and welfare, social pressures, intergovernmental relations.

433. INTERNATIONAL ORGANIZATION. Class 3, cr. 3. Prerequisite: POL 331.

Procedures and machinery of international cooperation, dispute settlement, legislation and administration, including the United Nations, its affiliated organizations, and other international systems and agencies.

435. INTERNATIONAL LAW. Sem. 2. Class 3, cr. 3. Prerequisite: POL 331.

A survey of the contemporary international system to identify international norms productd by and guiding the behavior of states, international organizations and, whenever pertinent, private persons.

439. UNITED STATES FOREIGN POLICY MAKING. Class 3, cr. 3.

A systematic study of the goals and policies of the United States in the contemporary world. Case method will be used to illustrate problems of strategy and tactics in such areas as Europe, Latin America, Africa, and the Far East.

454. SELECTED PROBLEMS IN MATERIALIST POLITICAL THOUGHT. Class 3, cr. 3. Prerequisite: POL 350, or consent of instructor.

An analytical survey of the American contribution to western political thought from the colonial period to the present day. The major themes and concepts of the American tradition are analyzed through study of the writings of representative thinkers, with special attention to the ideas which have affected the development of American political institutions.

UNDERGRADUATE LEVEL
Upper-Division Courses

500. POLITICAL SCIENCE: SCOPE AND EMPIRICAL THEORIES. Class 3, cr. 3. Prerequisite: POL 101 or equivalent.

An exploration of the scope of political science and of its development as a profession, followed by an analysis of major approaches to the study of politics. Also review of various research techniques.

510. POLITICAL PARTIES AND POLITICS. Class 3, cr. 3.

A study of political leadership, pressure groups, political parties, nominating processes, campaign strategies, voting behavior, and money in elections.

511. CONGRESS: STRUCTURE AND FUNCTIONING. Class 3, cr. 3.

A study of the legislative, investigative, supervisory, and other major functions of Congress with emphasis on how Congress actually operates and its relations with other parts of our political system.

515. PUBLIC OPINION AND ELECTORAL BEHAVIOR. Sem. 1 and 2. Class 3, cr. 3. Prerequisite: POL 101 or 301.

The formulation, manipulation, and political significance of public opinion in democratic and authoritarian states.

530. THEORIES OF INTERNATIONAL RELATIONS. Class 3, cr. 3. Prerequisite: POL 331.

A study of ideas concerning the nature of war and peace, imperialism, international organization, and diplomacy.

541. POLITICS OF DEVELOPING AREAS. Class 3, cr. 3. Prerequisite: POL 101 or 103.

An examination of major problems of political, socio-economic, and cultural development or underdevelopment in selected areas of Africa, Asia, and Latin America, with special attention focused on the heritage of colonialism, the struggle for independence, the influence of tribal or native traditions, and the role of modern elites, political parties, and governmental institutions against the background of social and technological transformation.

565. CURRENT POLITICAL IDEOLOGIES. Class 3, cr. 3. (el.). Prerequisite: POL 350.

Democracy, socialism, fascism, communism, and other political systems.

PSYCHOLOGY

Professor Naylor in charge, Lafayette

General Information

Psychology is a science which deals with the behavior of organisms. As such it is of interest to persons with a basic quest for understanding human behavior. It is also of value to persons who seek to apply a variety of skills with and through others. Those who lean toward psychology as a profession should plan to spend at least three or four years in graduate work. A wide range of professional opportunities exists, not only in college faculties, clinics, and hospitals but also in schools, industry and government.

PSY 120 may be taken as an elective or to meet requirements in various curricula. PSY 120 is normally a prerequisite for all programs in psychology. In special cases students may be permitted to take PSY 120 concurrently with one or more other courses in psychology. A student may also establish credit in PSY 120, under special circumstances, by examination.

Minors

A minimum of 12 semester hours is required for a minor, not including PSY 120. All minors will take PSY 200. At least nine additional semester hours will come from courses approved by the student's advisor.

Majors

A supporting minor need *not* be obtained with this major. A minimum of 24 semester hours (8 courses) is required toward a B.S. degree, not including PSY 120. All majors will take the following courses: 201, 200, 202, 310, 340, 423, 311, 480. It is recommended that pre-professional majors plan their programs so that they are able to enroll for the required courses in approximately the above order.

In addition to the required courses in psychology, a major, in consultation with his advisor, should plan a sequence of other courses to meet the requirements of the School of Humanities, Social Science, and Education and to satisfy his own interests and professional plans. Achievement of a degree results from the fulfillment of a well-chosen and balanced program.

Several courses outside of a department are strongly recommended for majors. These usually include mathematics, biology, sociology, and, frequently, physics, chemistry, economics, or philosophy. Students who intend to continue work in psychology should realize that most graduate schools require a reading knowledge of either French or German or both. In some cases Russian may be substituted for one of the above.

120. **ELEMENTARY PSYCHOLOGY.** Class 3, cr. 3.

Introduction to the fundamental principles of pyschology, covering particularly the topics of personality, intelligence, emotion, attention, perception, learning, memory, and thinking.

200. **INTRODUCTORY PSYCHOLOGICAL LABORATORY.** Class 1, Lab. 4, cr. 3. Prerequisite: PSY 120 or equivalent.

An introduction to laboratory techniques in learning, perception, motivation, and social behavior.

201. **INTRODUCTION TO STATISTICS.** Class 2, Lab. 2, cr. 3. Prerequisite: PSY 120.

Introduction to basic statistical concepts including such descriptive statistics as averages, measure of variability, and correlation, as well as an introduction to inferential statistics.

202. **PSYCHOLOGICAL MEASUREMENT.** Class 2, Lab. 2, cr. 3. Prerequisite: PSY 201.

Introduction to the general theory and method of psychological measurement including psycholphysics, scaling procedures, and the use of psychological tests as measuring devices.

235. **CHILD PSYCHOLOGY.** Class 3, cr. 3. Prerequisite: PSY 120 or equivalent.

General principles of children's behavior and development, from conception to adolescence, including sensory and motor development, and basic psychological processes such as learning, motivation, and socialization.

310. **SENSORY AND PERCEPTUAL PROCESSES.** Class 3, cr. 3. Prerequisite: six hours of psychology.

Theory, problems, and research in sensation and perception, including physiological bases and measurement techniques.

311. **MOTIVATION AND LEARNING.** Class 3, cr. 3. Prerequisite: six hours of psychology.

History, theory, and research in motivation and learning.

340. **GENERAL SOCIAL PSYCHOLOGY.** Class 3, cr. 3. Prerequisite: six hours of psychology, or three hours of psychology and three hours of sociology. (Same as SOC 340.)

Conditions and consequences of human behavior in social situations, with emphasis upon the mechanism and the process on the bases of which socialization takes place.

350. **ABNORMAL PSYCHOLOGY.** Class 3, cr. 3. Prerequisite: three hours of psychology.

Various forms of mental disorder from the standpoint of their origin, treatment, prevention, social significance, and relation to problems of normal human adjustment.

423. **PSYCHOLOGY OF PERSONALITY.** Class 3, cr. 3. Prerequisite: three hours of psychology.

The development, structure, and functioning of the normal personality.

433. **PROBLEMS IN CHILD PSYCHOLOGY.** Class 3, cr. 3. Prerequisite: six semester hours of psychology.

Development of the child from birth to adolescence, with special study of such topics as play, sex differences, and learning at different age levels.

480. **HISTORY AND FIELDS OF PSYCHOLOGY.** Class 3, cr. 3. Prerequisite: 12 hours of psychology.

Historical bases of modern empirical, applied, and theoretical psychology. Description of current areas and fields of psychology.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

500. **STATISTICAL METHODS APPLIED TO PSYCHOLOGY, EDUCATION, AND SOCIOLOGY.** Class 2, Lab. 2, cr. 3.

Descriptive statistics and an introduction to sampling statistics. Application to psychological, sociological, and educational data.

505. **MENTAL MEASUREMENT.** Class 2, Lab. 2, cr. 3. Prerequisite: six hours of psychology, including PSY 201 or PSY 500, or equivalent.

Introduction to the general area of mental measurement. Theory and content of measuring devices in the fields of intelligence, interests, personality, and special aptitudes.

532. **PSYCHOLOGY OF THE EXCEPTIONAL CHILD.** Class 3, cr. 3. Prerequisite: six hours of psychology.

Principles of diagnostic testing, adaptive teaching, and guidance applied to the improvement of teaching and to the correction of learning difficulties of exceptional children.

550. **INTRODUCTION TO CLINICAL PSYCHOLOGY.** Class 3, cr. 3. Prerequisite: 12 hours of psychology.

570. **INDUSTRIAL PSYCHOLOGY.** Class 3, cr. 3.

Survey of the applications of psychological principles and of research methodology to the various human problems in industry, such as: personnel selection and appraisal; the organizational and social context of human work; the job and work situation; human errors and accidents; and psychological aspects of consumer behavior.

GRADUATE LEVEL

665. **PERSONALITY THEORY.** Class 3, cr. 3. Admission by consent of instructor.

Critical evaluation of major theories of personality, the underlying scientific constructs, and the supporting research data.

666. **RESEARCH IN PERSONALITY.** Class 3, cr. 3.

SOCIOLOGY

Professor Breen in charge, Lafayette

100. **INTRODUCTORY SOCIOLOGY.** Class 3, cr. 3.

A survey course designed to introduce the student to the science of human society. Fundamental concepts, description, and analysis of society, culture, the socialization process, social institutions, and social change. A first course for sociology majors and a possible terminal course for nonmajors.

220. SOCIAL PROBLEMS. Class 3, cr. 3. Prerequisite: SOC 100 or equivalent.

Analysis of problem conditions in modern society—family disorganization, racial conflicts, class struggle, mental illness, narcotic addiction, gambling, alcoholism, and others. Social factors involved in the development, continued existence, and amelioration of these conditions.

305. AN INTRODUCTION TO CULTURAL ANTHROPOLOGY. Class 3, cr. 3.

An introduction to the science of man and his works. Emphasis on the nature of culture and culture change; relationship of culture and personality. Attention given to the variations within the "universal" institutions of man: language, technology, the family, systems of social control, economics, warfare, religion, art, and values. Processes of invention, diffusion, and acculturation; theoretical interpretations of the direction and process of cultural development.

340. GENERAL SOCIAL PSYCHOLOGY. Class 3, cr. 3. Prerequisite: three hours of psychology or sociology.

Conditions and consequences of human behavior in social situations, emphasis upon the mechanism and the processes on the basis of which socialization takes place.

350. MARRIAGE AND FAMILY RELATIONSHIPS. Class 3, cr. 3.

Designed to provide further understanding of family relationships for those unmarried, those contemplating marriage, those married, and prospective counselors of all of them. A functional approach to the interpersonal relationships of courtship, marriage, and family life. Open to both men and women.

380. INTRODUCTION TO METHODS OF SOCIAL RESEARCH. Class 3, cr. 3. Prerequisite: six hours of sociology.

Introduction to the methods of data collection and analysis and to the use of the scientific method in social research.

Formulation of hypotheses and research designs for their testing. Elementary principles for the conduct of experiments, observation, and interviewing, documentation, content analysis and surveys. Relationship between social research and social theory.

402. PRINCIPLES OF SOCIOLOGY. Class 3, cr. 3. Prerequisite: nine hours of sociology.

An advanced critical treatment of the theories, concepts, and methods of sociology. A basic course required of undergraduate majors in sociology.

411. SOCIAL STRATIFICATION. Class 3, cr. 3. Prerequisite: SOC 100 or 312, or equivalent.

Examination of systems of class and caste, with special attention to the United States; status, occupation, income, and other elements in stratification.

421. JUVENILE DELINQUENCY. Class 3, cr. 3. Prerequisite: SOC 100 or 312, or equivalent.

A study of social and psychological factors influencing individual delinquent behavior patterns. Emphasis on preventive and rehabilitative programs and the role of community agencies, such as social service agencies, juvenile courts, youth authorities. Visits to selected organizations and institutions.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

514. RACIAL AND CULTURAL MINORITIES. Class 3, cr. 3. Prerequisite: SOC 100 or 312, or equivalent.

America's minority groups; immigration; interracial and intercultural conflicts; assimilation.

516. INDUSTRIAL SOCIOLOGY. Class 3, cr. 3. Prerequisite: SOC 100 or 312, or equivalent.

The social organization of the factory, including consequences of the division of labor into staff-line and superior-subordinate relationships; relationships between social structure, leadership, morale, and productivity; union-management relations.

526. THE ANALYSIS OF COMPLEX ORGANIZATIONS. Class 3, cr. 3. Prerequisite: SOC 100 or 312, or equivalent.

The analysis of complex organizations such as the business enterprise, the military establishment, and the government bureau: the emergence of large-scale organizations; coordination and the division of labor; authority structure and control; the individual in the organization; organizational conflict and change; and bureaucracy and ideology.

553. THE SOCIOLOGY OF THE FAMILY. Class 3, cr. 3. Prerequisite: SOC 100 or 312, or equivalent.

The family as an ongoing institution, subject to forces such as culture, economics, social class, religion, and education, which affect family structure and internal familial processes of social control and integration. Consideration of the means by which the family effects changes in other institutions and in individuals. Use of historical data to augment study of current changes in family structure and functions.

634. **URBANIZATION.** Class 3, cr. 3. Prerequisite: SOC 100 or 312, or equivalent, plus three additional hours of sociology.

An intensive consideration of the processes of urbanization. History of urban centers; international changes in metropolitan areas; investigation of census and other data concerning cities; problems of definition and identification of urban areas; the social consequences of planned urban change; urban growth, deterioration, and redevelopment; federal and local programs in urban redevelopment.

SPEECH

Professor Nadeau in charge, Lafayette

Professor Horn, Chairman, Calumet Section

The areas of creative arts and speech are combined at the Calumet Campus. Students interested in the various phases of the creative arts and the arts and sciences of speech communication have a wider range of curricular options than the title of the department indicates. Programs are available (1) to meet requirements for the several concentrations, majors, or minors offered within the Department of Speech and Creative Arts at the Calumet Campus, or (2) to fulfill those requirements leading to licenses to teach speech (along with any of the possible minors) in public or private schools. These studies are intended to help students prepare themselves for those fields of endeavor in which communication plays an important part (i.e., theatre, painting, music and other applied arts, sales, public service, personnel management, law) or for teaching careers in public or private schools.

UNDERGRADUATE LEVEL

Lower-Division Courses

114. **FUNDAMENTALS OF SPEECH COMMUNICATION.** Class 3, cr. 3.

A study of communication theories as applied to speech; practical communicative experiences ranging from interpersonal communication and small group process through problem identification and solution in discussion, to informative and persuasive speaking in standard speaker-audience situations.

160. **VOICE AND DICTION.** Sem. 1. Class 1, Lab. 3, cr. 2.

Study of the formation of sounds, speech variables, breath control, and identification of sounds by listening practice, criticism, and correction in laboratory drill sessions; voice recordings and playback for personal correction and identification; some use of poetry and other literature.

210. **PRINCIPLES OF ADVOCACY AND DEBATE.** Class 3, cr. 3. Prerequisite: SPE 114.

A study of argumentative discourse in relation to forms of reasoning and evidence, modes of analysis of problems and audiences, and the planning and presentation of debate cases.

211. **PRACTICUM IN FORENSICS.** Lab. 2, cr. 1 or Lab. 4, cr. 2. Prerequisite: Consent of instructor. (May be repeated for credit; maximum total four credits.)

Practicum in supervised preparation of cases and participation in the various forms of intramural and intercollegiate debate.

212. **APPROACHES TO THE STUDY OF SPEECH COMMUNICATION.** Class 3, cr. 3.

A study of basic characteristics of human communication and the theoretical and practical implications of these characteristics for various forms of oral communication.

230. **RADIO AND TELEVISION BROADCASTING.** Class 3, cr. 3.

Survey of major types of radio and television broadcasting by the individual, by stations and networks, and by government; advertising; programming; educational and international broadcasting; survey of basic broadcasting problems.

232. **RADIO AND TELEVISION PERFORMANCE.** Class 1, Lab. 4, cr. 3. Prerequisite: SPE 114.

Study and practice in radio and television communication, continuity, news, interview, discussion, music, commercials, drama; basic voice instruction and technical orientation.

240. INTRODUCTION TO ORAL INTERPRETATION. Class 3, cr. 3.

Oral interpretation of prose, poetry, and dramatic dialogue based on careful study of meaning and emotional content.

Satisfies aesthetics requirement of the School of Humanities, Social Science, and Education.

241. PRACTICUM IN ORAL INTERPRETATION. Sem. 1 and 2. SS. Lab. 2 or 4, cr. 1 or 2. Prerequisite: consent of instructor. (May be repeated for credit; maximum total four credits.)

Practical training and experimentation in individual and ensemble oral interpretation.

UNDERGRADUATE LEVEL

Upper-Division Courses

314. ADVANCED PUBLIC SPEAKING. Class 3, cr. 3. Prerequisite: SPE 114.

Development of a marked degree of skill in the composition and delivery of various types of speeches; special emphasis on speeches related to the student's major vocational area.

315. SPEECH COMMUNICATION OF TECHNICAL INFORMATION. Class 3, cr. 3. Prerequisite: SPE 114. Open only to students enrolled in the School of Technology.

The organization and presentation of information of a practical technical nature. Emphasis is placed upon the study, preparation, and use of audio-visual materials in such presentations.

318. PRINCIPLES OF PERSUASION. Class 3, cr. 3. Prerequisite: SPE 114.

Review of evidence and the forms of reasoning as they apply to persuasion; consideration of the major persuasive principles and techniques; practice in their adaption to specific problems and audiences.

320. GROUP DISCUSSION AND CONFERENCE LEADERSHIP. Class 3, cr. 3. Prerequisite: SPE 114.

A study of group thinking and problem-solving methods; participation in and evaluation of committee and informal discussion groups.

321. PARLIAMENTARY PROCEDURE. Sem. 1 and 2. Class 2, cr. 2.

Principles and practice in the use of parliamentary procedure; order of business, nominations, elections, constitutions, amendments and by-laws, committees and boards, motions.

323. BUSINESS AND PROFESSIONAL SPEAKING. Sem. 1 and 2. SS. Class 3, cr. 3. Prerequisite: SPE 114.

The study of oral communication problems and responsibilities in the business-organizational environment. Participation in problem-solving from investigation and informative speaking to advocacy and parliamentary debate.

325. INTERVIEWING: PRINCIPLES AND PRACTICE. Class 3, cr. 3. Prerequisite: SPE 114.

Study and practice of methods used in business interviews, emphasizing logical and psychological bases of personal persuasion.

331. PRACTICUM IN RADIO AND TELEVISION BROADCASTING. Sem. 1 and 2, Lab. 2 or 4, cr. 1 or 2. Prerequisite: SPE 232 and consent of instructor. (May be repeated once only for credit.)

Assigned radio-television program production.

340. ORAL INTERPRETATION OF POETRY. Class 3, cr. 3. Prerequisite: One of the following—SPE 240, 260, ENGL 237, 240, 241, 350, 351, or consent of instructor.

Textual and dramatistic approaches to the analysis and oral interpretation of narrative, lyric, dramatic, and didactic poetry of English and American poets. Emphasis on the oral reading techniques of communicating the meanings and emotions of poetry.

415. DISCUSSION OF TECHNICAL PROBLEMS. Sem. 2. SS. Class 3, cr. 3. Prerequisite: SPE 315. Open only to students in the School of Technology.

Principles of speech communication related to interpersonal and group discussions on technical topics and problems; practice in using these modes in situations typically encountered by the technologists.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

504. DEVELOPMENT AND PROBLEMS OF SPEECH EDUCATION. Sem. 2. SS. Class 3, cr. 3. (Offered in 1969-70 and alternate years.) Prerequisite: consent of instructor.

Study of the evolution of content and method in the teaching of speech from classical and European roots to the present; special attention to the influences of great teachers, schools, movements, books, and events.

512. THEORIES OF INTERPERSONAL COMMUNICATION. Sem. 1. SS. Class 3, cr. 3. Prerequisite: SPE 212, or consent of instructor.

Review of contemporary theories, analysis of concepts, models, and pertinent research across the broad spectrum of interpersonal communication.

525. ADVANCED INTERVIEWING AND CONFERENCE METHODS. Sem. 2. Class 3, cr. 3. Prerequisite: SPE 325 or equivalent.

Application of modern communication theory to interview situations, with emphasis upon problems involving superior-subordinate relations, information-getting, and interpersonal misunderstanding. Classroom demonstrations based upon real-life cases supplemented by off-campus interviews; practice in briefing techniques.

530. BROADCAST JOURNALISM. Sem. 2. SS. Class 2, Lab. 2, cr. 3. Prerequisite: SPE 232 or consent of instructor.

The history and practice of broadcast journalism, with group and individual projects in various forms of broadcast journalism: straight news, feature reports, commentary, editorial, interview, and documentary.

531. RADIO AND TELEVISION PRODUCTION: THEORY AND ANALYSIS. Sem. 2. Class 3, cr. 3. Prerequisite: SPE 232 or consent of instructor.

Program types, comparative study of use of each medium; program policies, analysis of communication process as affected by radio and television; advanced production analysis.

532. RADIO AND TELEVISION IN EDUCATION. Sem. 1. SS. Class 3, cr. 3.

Survey of the educational and instructional applications of radio and television materials; analysis of selected problems in the educational uses of the media; analysis and application of production practices as related to the learning process.

534. COMPARATIVE BROADCAST SYSTEMS. Sem. 2. SS. Class 3, cr. 3. Prerequisite: SPE 230 or consent of instructor.

Historical, sociological, and political aspects of various systems of broadcasting throughout the world. Examination of American, Canadian, British, French, German, Soviet, and other broadcast institutions to discover why and how they are regulated and what impact they have on political, social, and economic development.

540. ADVANCED ORAL INTERPRETATION. Sem. 2. Class 3, cr. 3. Prerequisite: SPE 240 or equivalent.

Study and practice of the techniques of oral interpretation for public performances. Emphasis on analysis of materials, program building, and criticism. Consideration also given to utilizing oral reading techniques in the teaching of literature and speech at the secondary level.

541. ENSEMBLE INTERPRETATION. Sem. 1. SS. Class 3, cr. 3. Prerequisite: SPE 240, or equivalent.

A study of the history, theories, and styles of group oral presentation of literature including fictional, dramatic, nonfictional, and thematic subjects. Emphasis is placed on experimentation in the styles of presentation and on the development of analytical insights into the various literary forms.

542. ORAL INTERPRETATION OF ELIZABETHAN LITERATURE. Sem. 2. SS. Class 3, cr. 3. Prerequisite: SPE 240, or equivalent.

A study of the language, styles, and forms of Elizabethan literature for oral presentation. Analysis of the essay, lyric, drama, and other Elizabethan forms (through the study of such authors as Bason, Spenser, Donne, Jonson, Marlowe, and, especially, Shakespeare) and experimentation with the methods of their successful oral interpretation.

545. THEORIES OF ORAL INTERPRETATION. Sem. 1. SS. Class 3, cr. 3. Prerequisite: A course in oral interpretation, or consent of instructor.

A study of the theories of oral interpretation of literature that have emerged from the classical period of Greece and Rome to the present. Emphasis on the influence of leaders in the field during the 18th, 19th, and 20th centuries.

590. DIRECTED STUDY OF SPECIAL PROBLEMS. Sem. 1 and 2. cr. 1 to 3. Admission by consent of instructor. (May be repeated for credit.)

THEATRE: See Creative Arts

School of Industrial Management

Dean Day in charge, Lafayette
Professor Engle, Departmental Representative, Calumet

INDUSTRIAL MANAGEMENT

As modern society makes increasing use of technology, managers must keep informed to handle their own jobs effectively and to be able to understand and cooperate with the technical specialist. The industrial management curriculum, by including a required technical sequence, enables the student to take advantage of Purdue's excellent resources in science and technology. Through the technical option, students are provided an opportunity to acquire a basic understanding on a specific area in the field of science and technology. Such an objective is essential if the individual is to be capable of working effectively with engineers and scientists in a technically-based industry.

Included in the curriculum is a concentration of mathematics and quantitative methods courses designed to provide the necessary training and background in the use of rigorous analytic techniques applicable to management decisions. This program is designed to help the student develop this kind of broad understanding of the management process.

An administrator cannot be made in the short span of a few months or a year. Indeed, most individuals require years of experience to develop the skills, insights, and maturity of judgment which distinguish an effective manager. However, a professional management curriculum can give the student an effective start in his development as a manager. In brief, it can help him become a more useful member of his organization early in his career, and it can aid him in learning and growing more rapidly in positions of increasing responsibility.

ECONOMICS

In constrast to the technically-based internal approach utilized in the management program, the economics curriculum provides a coordinated series of courses in the field of economics and business as a means of developing a broad fundamental background in business organizations and the economic environment in which a business operates. The program includes four two-semester sequences covering economic principles, aggregative economics, statistics, and accounting, plus courses in business law and managerial economics. In addition, three related courses in economics and business, of special interest to the student, make possible a degree of specialization. Elective hours permit either further concentration in economics or enrichment in the general education area.

Business leaders, employment officials, and schools for advanced study, such as law schools, have endorsed this type of economics and business education with liberal arts background. The program satisfies the need of future junior business executives for a broad, liberal-arts-oriented base on which to build specific training and experience received on the job.

INDUSTRIAL MANAGEMENT

(Minimum credits for degree: 135 hours)

FRESHMAN YEAR

First Semester	Second Semester
(4) CHM 115 (General Chemistry)	(4) CHM 116 (General Chemistry)
(5) MA 161 (Mathematics for Engineering and the Physical Sciences I)	(5) MA 162 (Mathematics for Engineering and the Physical Sciences II)
(3) ENGL 101 (English Composition I)	(3) SPE 114 (Fundamentals of Speech Communication)
(3) POL 101 (Introduction to Government)	(3) ENGL 102 (English Composition II)
(1) ENGL 185 (Developmental Reading)	(3) *Elective
(2-3) *Elective	
(18-19)	(18)

SOPHOMORE YEAR

Third Semester	Fourth Semester
(3) ECON 215 (Basic Economics I)	(3) ECON 215 (Basic Economics II)
(3) INDM 200 (Introductory Accounting)	(3) INDM 201 (Cost Accounting)
(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)	(3) CS 210 (Laboratory on Data Processing)
(6-8) †Technical Option Prerequisites and other required courses	(3) Literature Elective
	(6) †Technical Option Prerequisites and other required courses
(16-18)	(18)

ECONOMICS

(Minimum credits for degree: 129)

FRESHMAN YEAR

First Semester	Second Semester
(3) ENGL 101 (English Composition I)	(3) ENGL 102 (English Composition II)
(3) ‡MA 1-53 (Algebra and Trigonometry I)	(3) ‡MA 154 (Algebra and Trigonometry II)
(3) §Cultural Sequence I	(3) §Cultural Sequence II
(3) History (200, 201, 251, or 252)	(3) Social Science Elective
(3) Science Elective	(3) Science Elective
(2-3) *Electives	(1) *Elective
(17-18)	(16)

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* Women are required to select PEW 101, 102, and 103 during their freshman year.

† For discussion of these courses, see pages 19-20 of the Industrial Management Bulletin.

‡ A higher level course may be taken, depending on student's mathematics background.

§ Completion of an approved four-course, cultural sequence selected from *one* of the following areas: English, history, modern language, political science, or philosophy.

SOPHOMORE YEAR

Third Semester

(3) MA 213 (Finite Mathematics I)
(3) INDM 200 (Basic Accounting)
(3) ECON 210 (Principles of Economics)
(3) PSY 120 (Elementary Psychology)
or
(3) SOC 100 (Introductory Sociology)
(3) Cultural Sequence III
(3) Literature Elective

(18)

Fourth Semester

(3) MA 214 (Finite Mathematics II)
(3) ECON 212 (Principles of Economics II)
(3) INDM 201 (Cost Accounting)
or
(3) INDM 202 (Financial Accounting)
(3) SPE 114 (Fundamentals of Speech Communication)
(3) Cultural Sequence IV
(3) Literature Elective

(18)

JUNIOR YEAR

Fifth Semester

(3) ECON 301 (Business Statistics I)
(3) ECON 330 (Introduction to Aggregative Economics I)
(3) Philosophy (110, 111, or 150)
(3) Economics "A" Elective
(3-6) Electives

(15-18)

Sixth Semester

(3) CS 210 (Laboratory on Data Processing)
(3) ECON 331 (Introduction to Aggregative Economics II)
(3) Economics "A" Elective
(3) Humanities (Art, Music, or Theatre)
(3-6) Electives

(15-18)

SENIOR YEAR

Seventh Semester

(2) GS 435 or 436 (Great Issues)
(9) Economics "B" Electives
(6) Electives

(17)

Eighth Semester

(3) ECON 470 (Legal Background for Business)
(3) ECON 419 (Managerial Economics)
(8-12) Electives

(14-18)

INDUSTRIAL MANAGEMENT AND TRANSPORTATION

UNDERGRADUATE LEVEL

Lower-Division Courses

100. **MANAGEMENT LECTURES.** Sem. 1 and 2. Class 1, cr. 1.

Survey of the field of industrial management.

200. **INTRODUCTORY ACCOUNTING.** Sem. 1 and 2. SS. Class 3, cr. 3 or Class 2, Lab. 2, cr. 3. (Required of undergraduate students in pre-industrial management and industrial economics.)

Introduction to the fundamentals of accounting.

201. **COST ACCOUNTING.** Sem. 1, 2, and SS. Class 3, cr. 3. Prerequisite: INDM 200 or equivalent.

Nature of cost accounting; job order, process, and standard cost methods. Preparation and uses of various types of cost reports.

202. **FINANCIAL ACCOUNTING.** Sem. 1 and 2. SS. Class 3, cr. 3. Prerequisite: IM 200.

Study of financial problems in the valuation of assets and realization of income with emphasis on contemporary areas such as accelerated depreciation, leasing, price level changes, business combinations, and taxation.

UNDERGRADUATE LEVEL

Upper-Division Courses

300. **FINANCIAL CONTROL.** Sem. 1 and 2. Class 3, cr. 3. Prerequisite: INDM 201 or equivalent.

Managerial uses of accounting and financial information as an aid in planning and controlling business operations.

302. **BUSINESS STATISTICS II.** Sem. 1 and 2. SS. Class 3, cr. 3.

Elemenary statistics in business: measures of central tendency, variability, etc.; index numbers, sampling, estimation, tests of hypotheses, correlation and regression, time series analysis.

305. **QUANTITATIVE METHODS FOR MANAGEMENT I.** Sem. 1 and 2. Class 3, cr. 3. Prerequisites: MA 261 and ECON 216.

General structure of decision problems and introduction to mathematical model building. Linear and dynamic programming, probability and statistical decision theory, inventory theory, and topics in operation research.

306. **QUANTITATIVE METHODS FOR MANAGEMENT II.** Sem. 1 and 2. Class 3, cr. 3. Prerequisite: INDM 305.

Continuation of topics listed under INDM 305, with emphasis on the effects of risk and uncertainty. Professor Denzler and Staff.

310. **FINANCIAL MANAGEMENT.** Sem. 1 and 2. Class 3, cr. 3. Prerequisite: INDM 201 or 202.

The management of financial functions in an industrial firm from the viewpoint of the financial officer.

320. **MARKETING MANAGEMENT.** Sem. 1 and 2. Class 3, Lab. 0, cr. 3. Prerequisite: INDM 201 or equivalent.

A managerial approach to the job of learning to make a decision on product policy, distribution channels, pricing, personal selling, advertising, and marketing research.

401. **ACCOUNTING PROBLEMS.** Sem. 1 and 2. Class 3, cr. 3. (el.) Prerequisite: INDM 201, or consent of instructor.

Types of accounting problems and procedures important for financial management policies. Subject matter includes accounting for the more complex types of corporate net worth structures; investments and funds; insurance; branch accounting; consolidations; and price level impact on financial statements.

430. **LABOR RELATIONS.** Sem. 1 or 2. Class 3, cr. 3. Prerequisite: AS 330, or consent of department. Credit will not be allowed for both INDM 430 and ECON 450.

A study of the economic, psychological, and legal aspects of employer-employee relations, with special attention given to wage determination and the negotiating of collective bargaining contracts.

431. **PERSONNEL RELATIONS.** Sem. 1 and 2. SS. Class 3, cr. 3.

Study of the personnel administration function in the business firm. Traditional staff functions and line and staff roles in motivation of employees.

442. **PERSONAL FINANCE.** Sem. 1 and 2. SS. Class 3, cr. 3. (el.). Prerequisite: ECON 210 or 213.

Lectures and problems in the use of credit; living within a given income; investment and speculative opportunities; protection afforded through insurance; home ownership; wills and trust plans; individual tax problems. Designed to afford practical help in the management of personal resources. Not available for credit towards economics and industrial economics concentrations.

445. **INVESTMENT MANAGEMENT.** Sem. 1 and 2. SS. Class 3, cr. 3. (el.) Prerequisite: Investment management ECON 210 or 213.

Investment policy and analysis.

446. **PERSONAL INSURANCE.** Sem. 1. Class 3, cr. 3. (el.) Prerequisite: ECON 210, 213, or 217.

Fundamentals of personal insurance: life insurance, health and accident insurance, and social insurance for old age, unemployment, and disability.

447. **PROPERTY INSURANCE.** Sem. 2. Class 3, cr. 3. (el.) Prerequisite: ECON 210, 213, or 217; ECON 446 is not a prerequisite.

Fundamentals of property and casualty insurance, such as fire, inland marine, automobile, and liability insurance.

455. **LEGAL BACKGROUND IN BUSINESS.** Sem. 1 and 2. SS. Class 3, cr. 3. Prerequisite: ECON 210, 213, or 217, or consent of instructor.

Nature and place of law in our society; social and moral bases of law enactment, regulation of business, legal liability, and enforcement procedures. Special emphasis on contracts.

456. **BUSINESS LAW.** Sem. 1 and 2. Class 3, cr. 3 (el.) Prerequisite: ECON 470, or consent of instructor.

Continuation of ECON 470. Bailments, sales, negotiable instruments.

457. **LEGAL FOUNDATIONS IN BUSINESS.** Sem. 1 and 2. Class 3, cr. 3. (Re-

quired of industrial management undergraduate students.) Prerequisite: senior standing in industrial management or consent of department.

Nature of our legal system and its significance for management. Social and moral basis of law, nature and enforcement of legal liability. Cases dealing with contracts, torts, negotiable instruments, and related topics.

553. **LABOR LAW I.** Sem. 1. SS. Class 3, cr. 3. (el.) Prerequisite: ECON 450, or consent of instructor.

Wage and hour legislation, workmen's compensation, social insurance, and other industrial relations law. Includes introduction to law of union-management relations. Professor Scaletta.

554. **LABOR LAW II.** Sem. 2. Class 3, cr. 3. A continuation of ECON 553.

Intensive study of development and current status of law of union-management relations. Labor and the antitrust laws, injunctions, arbitration law, and current legal regulation of labor relations.

583. **SMALL BUSINESS MANAGEMENT.** Sem. 1 and 2. Class 3, cr. 3. Open only to seniors and graduate students.

Business policy and problems as they are specifically related to the small company.

ECONOMICS

210. **PRINCIPLES OF ECONOMICS.** Class 3, cr. 3. (S, A, el. ENGR, P). Credit will be given for only one of ECON 210, 213, 215.

Study of the basic economic institutions, such as business, labor organizations, banks, and government. Analysis of the effects of competition, monopoly, and government on allocation of resources in production and consumption; factors affecting size and growth of national income.

212. **PRINCIPLES OF ECONOMICS II.** Class 3, cr. 3. (el. 4, 5, 6, 7, 8). Prerequisite: ECON 210.

Continuation of ECON 210. Emphasis on more thorough understanding of basic principles and their application to solving economic problems.

215. **BASIC ECONOMICS I.** Class 3, cr. 3. Required of undergraduate students in pre-industrial management. (Credit will not be given for both ECON 210 or 213 and ECON 215.) Prerequisite or corequisite: MA 162 or equivalent.

Elementary analysis of production and exchange, with particular attention given to monopoly and monopolistic competition as well as to competitive markets. It includes a thorough treatment of aggregative economics and an introduction to significant economic institutions.

216. **BASIC ECONOMICS II.** Class 3, cr. 3. (Required of pre-industrial management undergraduate students.) Prerequisite: MA 162 or equivalent.

A continuation of work begun in ECON 215.

217. **ECONOMICS.** Sem. 1 and 2. Class 3, cr. 3. (A.) Prerequisite: AGEC 100. Credit will not be given for both ECON 210 and 217.

Study of the micro- and macro-economic principles basic to the economy. National income determination and growth. Analysis of monopolistic and competitive factor and product markets. Applications of principles in solving economic problems.

219. **INTRODUCTORY ECONOMICS FOR FUTURE TEACHERS.** Class 3, cr. 3.

Structure and functioning of the American economic system. Social economic objectives related to the price system and public policy. Especial emphasis on use of this material in teaching social sciences in elementary and secondary schools.

UNDERGRADUATE LEVEL
Upper-Division Courses

330. **INTRODUCTION TO AGGREGATIVE ECONOMICS.** Sem. 1 and 2. Class 3, cr. 3. Prerequisite: two semesters of economic principles. (Credit will not be given for both ECON 330 and 530.)

Money, prices, and monetary standards. Banking and the supply of money. Relationship between money, prices, and income. International monetary relationships.

331. **INTRODUCTION TO AGGREGATIVE ECONOMICS II.** Sem. 1 and 2. Class 3, cr. 3. Prerequisite: ECON 330.

National income: size, fluctuation, explanations. Economic stabilization policies. International cyclical interrelationships. Economics of growth.

419. **MANAGERIAL ECONOMICS.** Sem. 1 and 2. Class 3, cr. 3. Prerequisites: ECON 212 and INDM 200.

The application of economic analysis and common nonmathematical models to concrete business decisions, such as capital acquisition and replacement, optimum inventory, and pricing. Linear programming is considered.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

519. THE MEANING OF PRICE AND RESOURCE ALLOCATION THEORY—FOR FUTURE SOCIAL STUDIES TEACHERS. Sem. 1 and 2. Class 3, cr. 3. Prerequisite: ECON 219, or ECON 210 and one course in teaching methods.

Structure and functioning of the American economic system, with emphasis upon price and resource allocation theory and upon public policy modifications of market decisions, as in agriculture, business, and labor. Practice in the use of source materials and student presentations.

School of Pharmacy and Pharmacal Sciences

Dean Tyler in charge, Lafayette

PHARMACOLOGY

UNDERGRADUATE LEVEL

Lower-Division Courses

201. PHARMACOLOGY FOR NURSES. Class 3, cr. 3.

An introduction to the pharmacological basis of therapeutics. Included are the study of the prescription, weights and measures, nomenclature, posology, dosage forms, therapeutic classifications and modes of administration. Factors which modify drug action will be discussed as well as contra-indications and drug reactions and their treatment. The relationship of the various members of the health team and their duties will be discussed.

(For pre-pharmacy program, see pages 95-96.)

School of Science

Dean Haas in charge, Lafayette

The School of Science consists of the Department of Biological Sciences, the Department of Chemistry, the Department of Physics, and the Division of Mathematical Sciences, which includes the Departments of Mathematics, Statistics, and Computer Sciences.

Curricula leading to two degrees, Bachelor of Science and Bachelor of Science in Chemistry, are offered by the School of Science. Specific details of these curricula and the requirements for the degrees are listed in the School of Science catalog.

The School of Science also offers training to selected students who wish to prepare themselves to teach in the fields of biology, chemistry, mathematics, physics, or in certain combinations of these fields.

BACHELOR OF SCIENCE DEGREE

General Education Requirements

The following general requirements for the B.S. degree in the School of Science are supplemented by requirements of the department of the student's major. Particular attention is drawn to modifications allowed in the curricula for prospective high school teachers (as indicated below).

1. A total of 124 semester hours, plus physical education for women as specified by the University.

2. English composition: One year of English composition, or ENGL 103 entered by achievement examination and completed with a grade of C or better.

3. Modern foreign language: Pass a fourth-semester college-level course in a modern foreign language, or pass an equivalent proficiency examination. In high school teacher curricula, the student must pass a second-semester college level course in a modern foreign language or pass a proficiency examination.

4. Humanities, social science, and behavioral sciences: The minimum requirement is 18 hours, but it is strongly recommended that the student take more than a minimal program. Six hours must be chosen from each of two of the following areas:

   a. literature, philosophy
   b. history, political science
   c. economics, sociology, psychology

A satisfactory two-course sequence must be chosen from one of the above areas.

5. Mathematics: At least 11 hours.

6. Science: Each student must take at least four courses in laboratory science (biology, chemistry, geology, physics) *outside his major area.* It is preferable that he take two-course sequences in each of two sciences; in no case shall he satisfy this requirement by courses drawn from more than two sciences.

BIOLOGICAL SCIENCES, PREMEDICINE, PREDENTISTRY, AND MEDICAL TECHNOLOGY

FRESHMAN YEAR

First Semester		Second Semester	
(3)	BIOL 103 (Principles of Biology)	(3)	BIOL 104 (Principles of Biology)
(4)	CHM 115 (General Chemistry)	(4)	CHM 116 (General Chemistry)
(3)	ENGL 101 (English Composition I)	(3)	ENGL 102 (English Composition II)
(3)	MA 213 (Finite Mathematics I)	(3)	MA 214 (Finite Mathematics II)
(3)	Modern Language (German or Russian recommended)	(3)	Modern Language
(16)		(16)	

SOPHOMORE YEAR

Third Semester	Fourth Semester
(3) CHM 220 (General Chemistry)	(3) CHM 256 (Organic Chemistry)
(3) CHM 255 (Organic Chemistry)	(1) CHM 256L (Organic Chemistry Laboratory)
(1) CHM 255L (Organic Chemistry Laboratory)	(3) BIOL 285 (Environmental Biology)
(3) MA 223 (Introductory Analysis I)	(3) MA 224 (Introductory Analysis II)
(2) BIOL 260 (Structural Biology)	(3) †Modern Language
(2) *BIOL 261 (Laboratory in Structural Biology)	(3) Humanities, etc. Elective
(3) †Modern Language (German or Russian recommended)	
(17)	(16)

CHEMISTRY

Students electing chemistry as a major may select either of two degree programs, depending upon their interest. These are:

Bachelor of Science in Chemistry Degree

This degree program is designed primarily for students planning to go on to graduate study or preparing for an industrial career as a chemist. It is planned to fulfill the recommendations of the Committee on Professional Training of the American Chemical Society; graduates who follow this program will be certified to the American Chemical Society as having fulfilled recommended requirements.

Bachelor of Science Degree

(Chemistry major or chemistry teaching major)

This degree program contains the same basic courses in chemistry as the B.S. in Chemistry degree program but has fewer requirements and thus permits more electives from other areas. It is recommended that students build a program of study from another area to complement this basic but minimal chemistry program. It is particularly suited for students preparing for careers as chemistry teachers, geochemists, biologists, medical doctors, scientific librarians, science writers, chemical salesmen, chemical patent attorneys, or other careers which require a less highly specialized training in chemistry than is offered for the B.S. in Chemistry degree.

The chemistry, mathematics, and physics courses in this degree program meet the Indiana certification requirements for a secondary-school teaching major in chemistry.

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* Medical technology majors may substitute 2-4 hours of biology electives.

† Medical technology majors may substitute 6 hours of electives for the second year of modern language.

In addition to the general education requirements of the School of Science the following courses are required for both the B.S. and the B.S. in Chemistry degrees:

General Chemistry (117, 126, or 115, 116, 220)	10 (or 11) cr.
Organic Chemistry (261, 262, 265L, 266L)	10 cr.
Physical Chemistry (373, 374, 374L)	8 cr.
Analytical Chemistry (321)	4 cr.
Inorganic Chemistry (442)	3 cr.
Mathematics (161, 162, 261)	14 cr.
Physics (152, 251)	9 cr.
	58 (or 59) credits

Additional requirements for the B.S. in Chemistry degree:

The required modern language is German.

Analytical Chemistry (524)	4 cr.
Chemical Literature (513)	1 cr.
Advanced Chemistry Electives	6 cr.
Mathematics (262)	4 cr.
Modern Physics (342, 342L)	4 cr.
Additional credit beyond the B.S. degree requirements	19 credits
Total credit in chemistry, mathematics, and physics	77 (or 78) credits

Chemistry Teaching Option

The chemistry, mathematics, and physics requirements are the same as the B.S. degree with a chemistry major. The general education requirements exempt the second year of modern language. A total of 18 hours in professional education is needed. This includes a professional semester with practice teaching in chemistry.

Honors Program

The Department of Chemistry has an Honors Program for superior students. Participation may begin in the freshman year and the student will be assigned to honors sections in chemistry courses taken as freshmen and sophomores. During the junior and senior years he will engage in undergraduate research and participate in research seminars. Support of this program by the National Science Foundation has made possible stipends of $600 for students engaged in summer research between the junior and senior years. Continued support is anticipated.

Application for formal admission to the Honors Program is made after completing the third semester of study in chemistry. The honors student is expected to achieve and maintain a scholastic index of at least 5.0. Students fulfilling requirements of the Chemistry Honors Program will be graduated "with honors in chemistry."

CHEMISTRY

FRESHMAN YEAR

First Semester

(4) CHM 115 (General Chemistry)
(3) ENGL 101 (English Composition)
(3) GER 101 (First Course in German)
(5) MA 161 (Mathematics for Engineering and the Physical Sciences I)

(15) Plus physical education (for women)

Second Semester

(4) CHM 116 (General Chemistry)
(3) ENGL 102 (English Composition II)
(3) GER 102 (Second Course in German)
(5) MA 162 (Mathematics for Engineering and the Physical Sciences II)

(15) Plus physical education (for women)

SOPHOMORE YEAR

Third Semester

(2) CHM 220 (General Chemistry)*
(3) CHM 261 (Organic Chemistry)
(2) CHM 265L (Organic Chemistry Laboratory)
(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)
(4) PHYS 152 (Mechanics and Sound)
(3) GER 203 (Third Course in German)

(18)

Fourth Semester

(3) CHM 262 (Organic Chemistry)
(2) CHM 266L (Organic Chemistry Laboratory)
(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(5) PHYS 251 (Heat, Electricity, and Optics)
(3) GER 244 (Fourth Course in Scientific German)

(17)

JUNIOR YEAR

Fifth Semester

(4) CHM 321 (Analytical Chemistry I)
(3) CHM 373 (Physical Chemistry)
(3) PHYS 342 (Modern Physics)
(1) PHYS 342L (Modern Physics Laboratory)
(6) Humanities, etc.

(17)

Sixth Semester

(3) CHM 374 (Physical Chemistry)
(2) CHM 374L (Physical Chemistry Laboratory)
(1) CHM 513 (Chemical Literature)
(6) Humanities, etc.
(3) Elective

(15)

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* For students with CHM 115-116 sequence.

SENIOR YEAR

Seventh Semester

(3)	CHM 442 (Inorganic Chemistry)
(3)	Humanities, etc.
(6)	Chemistry or Science Elective
(3)	Elective
(16)	

Eighth Semester

(4)	CHM 524 (Analytical Chemistry II)
(3)	Chemistry Elective
(3)	Science Elective
(3)	Humanities, etc.
(3-6)	Electives
(15-18)	

MATHEMATICAL SCIENCES

The requirements for the Bachelor of Science degree for the student in the Division of Mathematical Sciences are:

1. those of the University and the School of Science except courses below MA 161 do not count toward the degree,
2. those relating to the minor, and
3. those relating to the major.

Minor Requirements

In order to comply with these requirements, the student must acquire 18 credit hours in one of (1) the natural sciences, (2) the social sciences, or (3) the humanities, including at least three courses beyond the introductory level. Normally, all of the courses for the minor are taken within a single department, but courses in several departments within a single one of three areas will be acceptable if approved by the student's adviser. Courses may be used for the double purpose of fulfilling School of Science general education requirements and the minor requirement of the Division of Mathematical Sciences.

The guiding principle is that the student must acquire some depth of study in a subject other than mathematics. Physics is a good choice of minor for students in this division.

The requirements listed below are minimal, and it is expected that most students will take programs stronger than the minimum.

Suggestions concerning plans of study for a major whose primary interest is in applied mathematics, computer science, pure mathematics, statistics, or teaching can be obtained from the advisers in the section.

1. One of the basic calculus sequences (MA 161, 162, and 261 or MA 171, 172) is required.
2. MA 351 and MA 453 are required.
3. MA 361 and one of MA 362, MA 441, MA 301, CS 414 are required.
4. The student must acquire nine additional hours in courses numbered 300 or higher in mathematics, computer sciences, or statistics (note that certain courses are designated in the catalog description as not applicable). At most one statistical methods course may be counted in the nine hours.

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* Women will take courses in physical education during the first two semesters.

5. The student must earn a graduation index of at least 4.0 in those courses in the division which are used to fulfill the minimum requirements listed under 2, 3, and 4 above.

Remarks:

1. A more advanced course in the same general area, as determined by the student's adviser, may be substituted for a required course.
2. A program in pure mathematics should include MA 362, MA 441, MA 442, MA 454, and a geometry or topology course. A student planning to enter graduate school in mathematics should consult his adviser about additional offerings.
3. A minimal program for the student specializing in Statistics is STAT 551 and 552 and one of STAT 512, 513, or 514. A stronger program consists of MA 519, and two of STAT 528, 529, or MA 532. Students who do well in STAT 551, 552 are advised to take MA 532 or STAT 529.
4. Students preparing to teach in secondary schools must also meet the requirements set by the Teacher Education Council. For these requirements see the booklet *Purdue University Teacher Education Programs.* These requirements automatically meet those of the State of Indiana for teacher licensing. Note that the student preparing to teach should apply for admission to the teacher education program early in his third semester.
5. Admission to graduate school normally requires a strong undergraduate program with an index considerably higher than 4.0.
6. The catalog descriptions of the courses are necessarily brief and usually provide an inadequate basis for the student to judge whether a course is appropriate to his career objective and to his level of ability. Students are therefore encouraged to consult their instructors, fellow students, and faculty advisers concerning which courses to select to complete their programs.
7. The designation "with honors in mathematics" is awarded at commencement to those students who have completed, with distinction, a well-rounded undergraduate program, including strong courses in the major.

MATHEMATICS

FRESHMAN YEAR

	First Semester		Second Semester
(5)	MA 161 (Mathematics for Engineering and the Physical Sciences I)	(5)	MA 162 (Mathematics for Engineering and tthe Physical Sciences II)
(3)	ENGL 101 (English Composition I)	(3)	ENGL 102 (English Composition II)
(3)	Modern Language	(3)	Modern Language
(3-4)	*General Education Elective	(3-4)	*General Education Elective
(14-15)	Plus physical education for women	(14-15)	Plus physical education for women

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* Physical science elective is recommended freshman year; introductory courses in minor should be elected prior to Junior year.

SOPHOMORE YEAR

Third Semester	Second Semester
(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)	(3) MA 351 (Elementary Linear Algebra)
(3) Modern Language	(3) Modern Language
(9) General Education and Minor Electives	(9) General Education and Minor Electives
(16)	(15)

PHYSICS

The Department of Physics offers three plans of study leading to the Bachelor of Science degree.

The Honors Program (Plan A) is designed for students who intend to go on to top-ranked graduate schools and to become professional physicists. Plan B is intended to be suitable for a wide variety of students interested in physics, including those desiring a broad general education together with specialization in physics. Plan B gives a more than adequate background for advanced study at the physics graduate schools. Plan C is designed for prospective teachers of physics in high schools. Such students should note that, in addition to meeting the requirements for the degree, it is essential for them to complete the requirements for certification imposed by the state in which they expect to teach.

A student who wishes to enter the Honors Program should consult the School of Science Catalog. In order to receive a physics degree in Plans B or C, a student must maintain a grade-point average of 4.0 or above in all physics courses. Students will be allowed to transfer from other fields to a major in physics only if they have a grade point average of 4.0 in all physics and mathematics courses completed up to that time and have received a grade below C in not more than one such course.

1. General requirements:
    a. The general requirements of the School of Science and the University.
    b. Twenty-four hours of mathematics, including MA 161, 162, 261, and 262, or equivalent.
    c. Eight hours of chemistry (CHM 115 and 116, or equivalent).
    d. Six additional hours of science courses chosen from biology, chemistry and geology. The courses chosen to satisfy requirements c. and d. must be drawn from not more than two sciences.

2. Physics requirements:
    a. Plan B. PHYS 152, 251, 342, 342L (or 352), 322, 310, 330, 350, 351, 515, and 550 (or 542).
    b. Plan C. PHYS 152, 251, 342, 322, 310, 330, 350, 351, 352, and 542 (or 550). In addition, the student is required to take a course in astronomy in order to meet teacher-certification requirements.

3. Sample programs:

Sample programs under the two plans follow. The "electives" denote courses needed to complete general degree requirements, or free electives. It should be noted that the Plan C program provides for a minor in mathematics as well as a major in physics.

FRESHMAN YEAR

Plan B

First Semester

(5) MA 161 (Mathematics for Engineering and the Physical Sciences I)
(3) ENGL 101 (English Composition I)
(4-5) CHM 115 (General Chemistry)
or
CHM 117 (Advanced General Chemistry)
(3) Modern Language

(15-16)*

Second Semester

(5) MA 162 (Mathematics for Engineering and the Physical Sciences II)
(4) PHYS 152 (Mechanics and Sound)
(4-5) CHM 116 (General Chemistry)
or
CHM 126 (Advanced General Chemistry with Qualitative Analysis)
(3) Modern Language

(16-17)*

SOPHOMORE YEAR

Third Semester

(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)
(5) PHYS 251 (Heat, Electricity, and Optics)
(3) ENGL 102 (English Composition II)
(3) Modern Language

(15)

Fourth Semester

(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(3) PHYS 342 (Modern Physics)
(1) PHYS 342L (Modern Physics Laboratory)
(3) Modern Language
(6) Electives

(17)

JUNIOR YEAR

Fifth Semester

(4) PHYS 310 (Intermediate Mechanics)
(3) PHYS 322 (Oscillations and Waves)
(2) PHYS 350 (Intermediate Laboratory I)
(3) Mathematics elective
(6) Electives

(18)

Sixth Semester

(3) PHYS 330 (Intermediate Electricity and Magnetism)
(2) PHYS 351 (Intermediate Laboratory II)
(3) Mathematics elective
(9) Electives

(17)

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* Women will take courses in physical education the first two semesters.

SENIOR YEAR

Seventh Semester

(3) PHYS 542 (Survey of Modern Physics I) or
PHYS 550 (Introduction to Quantum Mechanics)
(3) PHYS 515 (Thermodynamics)
(9) Electives

(15)

Eighth Semester

(15) Electives

(15)

Plan C

FRESHMAN YEAR

First Semester

(5) MA 161 (Mathematics for Engineering and the Physical Sciences I)
(3) ENGL 101 (English Composition I)
(4-5) CHM 115 (General Chemistry) or
CHM 117 (Advanced General Chemistry)
(3) Elective

(15-16)*

Second Semester

(5) MA 162 (Mathematics for Engineering and the Physical Sciences II)
(4) PHYS 152 (Mechanics and Sound)
(4-5) CHM 116 (General Chemistry) or
CHM 126 (Advanced General Chemistry with Qualitative Analysis)
(3) Elective

(16-17)*

SOPHOMORE YEAR

Third Semester

(4) MA 261 (Mathematics for Engineering and the Physical Sciences III)
(5) PHYS 251 (Heat, Electricity, and Optics)
(3) ENGL 102 (English Composition II)
(3) Elective

(15)

Fourth Semester

(4) MA 262 (Mathematics for Engineering and the Physical Sciences IV)
(3) PHYS 342 (Modern Physics)
(9) Electives

(16)

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* Women will take courses in physical education the first two semesters.

JUNIOR YEAR

Fifth Semester

(4) PHYS 310 (Intermediate Mechanics)
(3) PHYS 330 (Intermediate Electricity and Magnetism)
(2) PHYS 330L (Electricity and Magnetism Laboratory)
(3) Mathematics elective
(3) Modern Language
(3) Elective

(18)

Sixth Semester

(4) PHYS 322 (Intermediate Optics)
(3) Mathematics elective
(3) Modern Language
(6) Electives

(16)

SENIOR YEAR

Seventh Semester

(3) PHYS 542 (Survey of Modern Physics I)
or
PHYS 550 (Introduction to Quantum Mechanics)
(3) ED 285 (Educational Psychology)
(9) Electives

(15)

Eighth Semester

(15) Professional Semester: prescribed curriculum in education

(15)

PREPHARMACY

The Purdue School of Pharmacy and Pharmacal Sciences does not admit students directly from high school. Students wishing to prepare for the profession of pharmacy register in the School of Science for the prepharmacy program and apply for transfer to the School of Pharmacy and Pharmacal Sciences at the end of the freshman year. Application for the transfer should be filed with the dean of the Pharmacy School or with the pharmacy adviser before April 1. Students who, for any reason, do not transfer to the School of Pharmacy and Pharmacal Sciences may apply for transfer to any other school of the University or may remain in the School of Science, with a change of educational objective.

PRE-PHARMACY YEAR

First Semester

(3) MA 153 (Algebra and Trigonometry I)
(4) CHM 111 (General Chemistry)
(3) ENGL 101 (English Composition I)
(3) SPE 114 (Fundamentals of Speech Communication)
(1) PHAR 100 (Orientation)
(2-3) Elective or physical education

(16-17)

Second Semester

(3) MA 154 (Algebra and Trigonometry II)
(4) CHM 112 (Qualitative Analysis)
(3) ENGL 102 (English Composition II)
(1) PHAR 101 (Orientation)
(3) Elective
(2-3) Elective or physical education

(16-17)

SECOND YEAR

Third Semester		Fourth Semester	
(3)	BIOL 103 (Principles of Biology)	(3)	BIOL 104 (Principles of Biology)
(4)	MDCH 204 (Organic Chemistry)	(4)	MDCH 205 (Organic Chemistry)
(4)	PHYS 220 (General Physics)	(4)	PHYS 221 (General Physics)
(1)	PHAR 260 (Calculations)	(5-6)	Electives
(3-4)	Electives		
(15-16)		(16-17)	

ELECTIVES

Fifteen credit hours must be selected from two general areas of study: (1) humanities and (2) social studies and behavioral sciences. A minimum of six credit hours must be taken in each area. The 15 elective credit hours must be completed during the first six semesters. ECON 210 shall be counted toward the satisfaction of this requirement. Departments and courses which will meet the requirement for these restricted electives are the following:

Humanities

English (all courses numbered 200 and above)
Modern Languages (all courses)
Philosophy (all courses)
Speech (all courses numbered 160 and above)

Social studies and behavioral sciences

Economics (all courses)
History (all courses)
Political Science (all courses)
Sociology (all courses)

CHM 115 and CHM 116 or CHM 111, 112 and 223 may replace CHM 109 and CHM 110.

PHAR 100, 101 and PHAR 260 may be postponed until the student transfers to the Lafayette Campus.

BIOLOGICAL SCIENCES

Professor Koffler in charge, Lafayette

Professor Wilson, Departmental Representative, Calumet

UNDERGRADUATE LEVEL

Lower-Division Courses

103. **PRINCIPLES OF BIOLOGY.** Class 2, Lab. 2, cr. 3.

The nature of the living state, and experimental approaches in studying it.

104. **PRINCIPLES OF BIOLOGY.** Class 2, Lab. 2, cr. 3.

Continuation of BIOL 103.

108. **INTRODUCTION TO BOTANY.** Class 3, Lab. 3, cr. 4. (1 A, 3 P, el. S).

Introduction to the growth, functioning, structures, heredity, diversity of plants, and their interactions with the environment.

109. **INTRODUCTION TO ZOOLOGY.** Class 2, Lab. 4, cr. 4. (1 A, 3 P, el. S).

Introduction to the structure, functioning, heredity, development, classification, and evolution of animals, and their interactions with the environment.

201. BIOLOGY OF MAN. Class 2, cr. 2. (3 H, 3 PEM, 3 PEW, el. S).

Introduction to human biology with emphasis on anatomy and physiology.

202. LABORATORY IN HUMAN BIOLOGY. Lab. 2, cr. 1. (3 H, 3 PEM, 3 PEW, el. S).

203. BIOLOGY OF MAN. Class 2, cr. 2. (4 H, 4 PEM, 4 PEW, el. 7).

Continuation of BIOL 201 (ZOOL 260, 360).

204. LABORATORY IN HUMAN BIOLOGY. Lab. 2, cr. 1. (4 H, 4 PEM, 4 PEW, el. S). Must be accompanied by BIOL 203 (ZOOL 260, 360).

205. BIOLOGY FOR ELEMENTARY SCHOOL TEACHERS. Class 2, Lab. 2, cr. 3.

Introduction to biology applicable to teaching in the elementary schools, including aspects of conservation, safety, nutrition, personal and public health.

206. BIOLOGY FOR ELEMENTARY SCHOOL TEACHERS. Class 2, Lab. 2, cr. 3.

Continuation of BIOL 205 (BIOL 205).

220. INTRODUCTION TO MICROBIOLOGY. Class 2, Lab. 3, cr. 3. (6 H, el. S). (When offered through the regional campuses: Class 2, Lab. 2, cr. 3). Prerequisites: one year of general chemistry and one semester of a life science.

The isolation, growth, structure, functioning, heredity, identification, classification, and ecology of microorganisms, their role in nature and significance to man.

221. INTRODUCTION TO MICROBIOLOGY. Class 2, Lab. 4, cr. 4. (3 A, 5 H, 5 P, el. 5 CE, S). Prerequisites: one year of general chemistry and one semester of a life science.

The isolation, growth, structure, functioning, heredity, identification, classification, and ecology of microorganisms, their role in nature and significance to man.

260. STRUCTURAL BIOLOGY. Class 2, cr. 2. Prerequisite: BIOL 104 or equivalent.

Structure of plants and animals, with emphasis on functional and phylogenetic relationships.

261. LABORATORY IN STRUCTURAL BIOLOGY. Lab. 4, cr. 2. Prerequisite or corequisite: BIOL 260.

285. ENVIRONMENTAL BIOLOGY. Class 2, lab. 3, cr. 3. Prerequisites: BIOL 260 and a year of general chemistry.

Adaptation and competition, and the relationship of organisms to their physical environment. Natural selection and other aspects of evolution; origin and integration of species and communities; ecosystems.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

520. CELL BIOLOGY. Sem. 1 and 2. Class 2, cr. 2. Prerequisites: a semester of a life science and a semester of organic chemistry: corequisite: BIOL 521, unless by consent of instructor.

Composition, structure, heredity, and growth of cells. Analysis of the cell concept in biochemical terms.

521. LABORATORY IN CELL BIOLOGY. Sem. 1. Lab. 4, cr. 2. Prerequisite or corequisite: BIOL 520.

525. MICROBIOLOGY. Sem. 2, Class 2, cr. 2. Prerequisite: BIOL 520 and 521; corequisite: BIOL 526, unless by consent of instructor.

Continuation of BIOL 520, with emphasis on bacteria and viruses, and more intensive study of their isolation, composition, structure, heredity, nutrition, metabolism, growth, reproduction and death, identification, classification, ecology, role in nature, and significance to man.

526. LABORATORY IN MICROBIOLOGY. Sem. 2. Lab. 4, cr. 2. Prerequisite or corequisite: BIOL 525.

555. ANIMAL PHYSIOLOGY. Class 3, Lab. 3, cr. 4. Prerequisite: BIOL 104 or equivalent.

Study of the principles and techniques of animal physiology, with emphasis on vertebrates. Designed primarily for secondary school teachers.

566. DEVELOPMENTAL BIOLOGY. Sem. 1 and 2. SS. 1969 and alternate summers. Class 2, cr. 2. Must be preceded by BIOL 260, preceded or accompanied by BIOL 521, and accompanied by BIOL 567, unless by consent of instructor.

Principles of development of plants and animals; the formation of organ systems.

567. LABORATORY IN DEVELOPMENTAL BIOLOGY. Sem. 1 and 2. SS. 1969 and alternate summer. Lab. 4, cr. 2. Must be preceded or accompanied by BIOL 566.

Descriptive and experimental study of the development of plants and animals.

595. SPECIAL ASSIGNMENTS. Sem. 1 and 2. SS. cr. 1-4.

Special work, such as directed reading, independent study or research, supervised library, laboratory, or field work, or presentation of material not available in the formal courses of the department. The field in which work is offered will be indicated in the student's record. Required of undergraduate students working for departmental "honors," and M.S. candidates in the nonthesis option. May be repeated for credit.

CHEMISTRY

Professor Foster in charge, Lafayette

Professor Fayle, Chairman, Calumet Section

111. GENERAL CHEMISTRY. Class 2, Lab. 3, cr. 3. (1 A, 5 IED, el. H, op. 1 S).

Required of all freshmen registered in the School of Agriculture or in biology options of the School of Science, who are not in CHM 115 or 117.

112. GENERAL CHEMISTRY. Class 2, Lab. 3, cr. 3. (2 A, 6 IED, el. H, op. 2 S).

Continuation of CHM 111.

115. GENERAL CHEMISTRY. Class 3, Lab. 3, cr. 4. (1 ENGR, IED, op. 1 A, S). Required of students majoring in chemistry, physics, and engineering who do not take CHM 117-126.

Laws and principles of chemistry, with special emphasis on topics of importance in engineering. Numerical problems and relationships are introduced whenever quantitative treatment is possible.

116. GENERAL CHEMISTRY. Class 3, Lab. 3, cr. 4. (2 ENGR, IED, op. 2, A, S).

A continuation of CHM 115.

119. GENERAL CHEMISTRY. Class 2, Lab. 3, cr. 3. (Offered only in the Nurses' Training Program.)

220. GENERAL CHEMISTRY. Class 2, Lab. 3, cr. 3. (op. ENGR, A, S). Prerequisite: CHM 116. Required of students who have completed CHM 115 and CHM 116 and who are planning to take CHM 573.

A consideration of certain principles of general and analytical chemistry which are not covered in CHM 115 and CHM 116. This course is designed to bridge the gap between tthe course sequences 115-116 and 117-126.

223. INTRODUCTORY QUALITATIVE ANALYSIS. Class 2, Lab. 6, cr. 4. (op. 5 A, el. H, S). Prerequisite: CHM 108, 112, 116, or 118.

Introduction to semimicro qualitative analysis for those whose requirements do not call for CHM 126.

251. ORGANIC CHEMISTRY. Sem. 2. Class 4, cr. 4. Prerequisite: CHM 109.

Introduction to organic chemistry.

251L. ORGANIC CHEMISTRY LABORATORY. Sem. 1 and 4. SS. Lab. 3, cr. 1.

Laboratory experiments to accompany CHM 251.

255. ORGANIC CHEMISTRY. Class 3, cr. 3. (op. H, el. S). Prerequisite: CHM 108, 110, 112, 116, or 118.

255L. ORGANIC CHEMISTRY LABORATORY. Lab. 3, cr. 1. (op. H, el. S).

Laboratory experiments to accompany CHM 255.

256. ORGANIC CHEMISTRY. Class 3, cr. 3. (op. H, el. S).

Continuation of CHM 255.

256L. ORGANIC CHEMISTRY LABORATORY. Lab. 3, cr. 1. (op. H, el. S).

Laboratory experiments to accompany CHM 256.

261. ORGANIC CHEMISTRY. Class 3, cr. 3. (3 CHE, el. A, H, S). Prerequisite: CHM 126 or CHM 220; or corequisite: CHM 220.

An introductory course covering aliphatic and alicyclic compounds. Required of students majoring in chemistry.

262. ORGANIC CHEMISTRY Class 3, cr. 3. (4 CHE, el. A, H, S). Prerequisite: CHM 261.

A continuation of CHM 261 covering aromatic compounds and selected topics. Required of students majoring in chemistry.

263L. ORGANIC CHEMISTRY LABORATORY. Sem. 1, Lab. 3, cr. 1.

Laboratory experiments to accompany CHM 261.

264L. ORGANIC CHEMISTRY LABORATORY. Sem. 2, Lab. 3, cr. 1.

Laboratory experiments to accompany CHM 262.

265L. ORGANIC CHEMISTRY LABORATORY. Sem. 1, Lab. 6, cr. 2.

Laboratory experiments to accompany CHM 261.

266L. ORGANIC CHEMISTRY LABORATORY. Sem. 2, Lab. 6, cr. 2.

Laboratory experiments to accompany CHM 262.

321. ANALYTICAL CHEMISTRY I. Sem. 1. Class 2, Lab. 6, cr. 4. Prerequisites: CHM 126 or CHM 220, and one year of organic chemistry. Required of students majoring in chemistry.

Quantitative measurements on complex chemical systems that show matrix effects or require isolation of a component prior to its determination; general approaches to qauntitation problems at the trace level; critical comparisons of competitive procedures with emphasis upon principles of separation processes, including chromatography; recognition and evaluation of possible sources of error; approaches for optimizing conditions so as to minimize time and/or efforts required to attain prescribed levels of accuracy and precision.

373. PHYSICAL CHEMISTRY. Class 3, cr. 3. Prerequisites: CHM 126 or 220, MA 261, and two semesters of college physics.

Constitution of matter; general properties of gases, liquids, and solids; phenomena of solutions; special topics of electrochemistry, thermodynamics, thermochemistry, chemical statics and dynamics, chemical equilibrium, and the phase rule.

374. PHYSICAL CHEMISTRY. Sem. 1 and 2. SS. Class 3, cr. 3. Prerequisite: CHM 373.

Phase equilibria, liquids, electrolytic sotions and cells, structure of atoms and molecules, spectroscopy, chemical kinetics, the solid state.

374L. PHYSICAL CHEMISTRY LABORATORY. Sem. 1 and 2. Lab. 6, cr. 2. Laboratory portion of CHM 373 and CHM 374.

442. INORGANIC CHEMISTRY. Sem. 2, Class 3, cr. 3. Prerequisite or corequisite: CHM 374.

Interpretation and correlation of inorganic reactions.

442L. INORGANIC CHEMISTRY LABORATORY. Sem. 2, Lab. 3, cr. 1.

Laboratory work to accompany CHM 444.

499. SPECIAL ASSIGNMENTS. Sem. 1 and 2. Lab. 3 to Lab. 15, cr. 1 to 5.

Special work, such as a senior thesis, not included in other courses.

UNDERGRADUATE LEVEL

Upper-Division Courses

513. CHEMICAL LITERATURE. Sem. 1 and 2. Class 1, cr. 1.

Types of information in technical publications; exercises in finding, assembling and using such data.

524. ANALYTICAL CHEMISTRY II. Sem. 1, Class 2, Lab. 6, cr. 4. Prerequisite: CHM 421; prerequisite or corequisite: CHM 374.

Principles and application of optical and electrical methods of chemical analysis, including topics in instrumentation.

533. INTRODUCTORY BIOCHEMISTRY. SS. Sem. 1. Class 3, cr. 3. Prerequisites or corequisites: CHM 224 and 256, or equivalent.

Chemistry and utilization in the living organisms of lipids, carbohydrates, proteins, enzymes, and hormones; physiological and chemistry of the blood, urine, and other fluids and tissues; essentials of nutrition.

534. INTRODUCTORY BIOCHEMISTRY. SS. Sem. 2. Class 3, cr. 3.

Continuation of CHM 533 with emphasis on enzymatic catalysis and metabolic transformations.

534L. BIOCHEMISTRY LABORATORY. Sem. 1. Lab. 3, cr. 1.

Laboratory work to accompany CHM 533. If more laboratory work is desired, the student may register for CHM 530 at the same time.

548. RADIOCHEMISTRY. Sem. 2. Class 2, cr. 2. Prerequisite: CHM 374 or equivalent.

Elements of nuclear chemistry; the uses of isotopes in chemical research; elementary principles of radiation chemistry.

548L. RADIOCHEMISTRY LABORATORY. SS. Lab. 3, cr. 1. Prerequisite or corequisite: CHM 548.

Laboratory work to accompany CHM 548.

563. ORGANIC CHEMISTRY. Sem. 1. Class 3, cr. 3. Prerequisite: elementary organic chemistry.

DIVISION OF MATHEMATICAL SCIENCES

Professor MacLane, head of division, Lafayette
Professor Yates, chairman, Calumet Section

MATHEMATICS

SPECIAL SERVICE COURSES

1. **HIGH SCHOOL ALGEBRA.** Class 5, cr. 0. Credit: one unit for admission.

2. **PLANE GEOMETRY.** Class 5, cr. 0. Credit: one unit for admission.

UNDERGRADUATE LEVEL

Lower-Division Courses

111. **ALGEBRA.** Class 3, cr. 3.

112. **TRIGONOMETRY.** Class 3, cr. 3. Should be preceded by MA 111.

123. **ELEMENTARY CONCEPTS OF MATHEMATICS I.** Class 3, cr. 3. Not open to students with credit in MA 133.

Numeration system; natural numbers; mathematical systems; mathematical reasoning; elementary set theory; elementary logic; mathematical proof; the number system of arithmetic; arithmetic algorithms.

124. **ELEMENTARY CONCEPTS OF MATHEMATICS II.** Class 3, cr. 3. Prerequisite: MA 123. Not open to students with credit in MA 133.

The system of integers; rational numbers; polynominals; the real and complex number systems; elements of plane geometry; relations, functions, and graphs; elements of analytic geometry.

133. **MATHEMATICS FOR ELEMENTARY TEACHERS I.** Class 4, cr. 4. Not open to students with credit in MA 123.

Numeration systems; finite mathematical systems; abstract mathematical systems, groups, fields; natural numbers through rationals, a structural approach, properties, algorithms; mathematical reasoning and proof.

134. **MATHEMATICS FOR ELEMENTARY TEACHERS II.** Class 4, cr. 4. Prerequisite: MA 133 or MA 124.

Informal study of metric and nonmetric properties of geometric figures (primarily in a plane), measurement; introduction to foundations of Euclidean geometry.

151. **ELEMENTARY MATHEMATICS FOR ENGINEERING AND THE PHYSICAL SCIENCES.** Class 5, cr. 5.

College algebra and trigonometry for students with inadequate preparattion for MA 161. Does not carry credit toward graduation in the Schools of Engineering or the Division of Mathematical Sciences.

151A. **ELEMENTARY MATHEMATICS FOR ENGINEERING AND THE PHYSICAL SCIENCES.** Class 5, cr. 5.

Not open to students with credit in MA 151, MA 153, MA 154, MA 153A, or MA 154A.

College algebra and trigonometry for students in the School of Technology. Does not carry credit toward graduation in the Schools of Engineering or the Division of Mathematical Sciences.

153. **ALGEBRA AND TRIGONOMETRY I.** Class 3, cr. 3. Not open to students with credit in MA 151, MA 151A, MA 153A, or MA 154A.

MA 153 together with MA 154 meets the mathematics requirement for the School of Humanities, Social Science, and Education. Does not carry credit toward graduation in the Schools of Engineering and the Division of Mathematical Sciences.

153A. **ALGEBRA AND TRIGONOMETRY I.** Class 3, cr. 3. Not open to students with credit in MA 151, MA 151A, MA 153, or MA 153A.

MA 153A-154A is a two semester version of MA 151A. Does not carry credit toward graduation in the Schools of Engineering and the Division of Mathematical Sciences.

154. **ALGEBRA AND TRIGONOMETRY II.** Class 3, cr. 3. Not open to students with credit in MA 151, MA 151A, or MA 154A.

Continuation of MA 153. Does not carry credit toward graduation in the Schools of Engineering and the Division of Mathematical Sciences.

154A. **ALGEBRA AND TRIGONOMETRY II.** Class 3, cr. 3. Not open to students with credit in MA 151, MA 151A, or MA 154.

Continuation of MA 153A. Does not carry credit toward graduation in the Schools of Engineering and the Division of Mathematical Sciences.

161. **MATHEMATICS FOR ENGINEERING AND THE PHYSICAL SCIENCES I.** Class 5, cr. 5.

Analytic geometry and calculus: derivatives of algebraic functions. Required of all students majoring in mathematics, physics, chemistry and all engineering students. Students with inadequate preparation will be required to take MA 151.

162. MATHEMATICS FOR ENGINEERING AND THE PHYSICAL SCIENCES II. Class 5, cr. 5. Prerequisite: MA 161.

Calculus: Integrals, applications of derivatives and integrals, formal integration.

213. FINITE MATHEMATICS I. Class 3, cr. 3. Prerequisite: MA 151 or equivalent.

Elementary logic, basic set theory, finite mathematical models, elementary probability theory. Applications to problems in the biological and social sciences.

214. FINITE MATHEMATICS II. Class 3, cr. 3. Prerequisite: MA 213.

Linear algebra: simultaneous linear equations, determinants, matrices and vectors; linear programming; game theory; Markov chains. Applications to problems in the biological and social sciences.

223A. INTRODUCTORY ANALYSIS I. Class 3, cr. 3. Prerequisite: MA 151A or equivalent. Should be preceded by MA 214.

Elementary properties of algebraic systems; the real number system; analytic geometry, differential and integral calculus of one variable. Applications to problems in the biological and social sciences.

224A. INTRODUCTORY ANALYSIS II. Class 3, cr. 3. Prerequisite: MA 223A.

Partial derivatives; calculus of finite differences; differentials; multiple integrals; introduction to difference and differential equations. Applications to problems in the biological and social sciences.

261. MATHEMATICS FOR ENGINEERING AND THE PHYSICAL SCIENCES III. Class 4, cr. 4. Prerequisite: MA 162.

Calculus: Indeterminate forms, parametric equation, solid analytic geometry, partial differentiation, multiple integrals.

262. MATHEMATICS FOR ENGINEERING AND THE PHYSICAL SCIENCES IV. Class 4, cr. 4. Prerequisite: MA 261.

Calculus: Infinite series, elements of differential equations.

UNDERGRADUATE LEVEL

Upper-Division Courses

301. TOPICS IN ELEMENTARY ANALYSIS. Class 3, cr. 3. Prerequisite: MA 261.

A critical study of classical problems, involving limit concepts, which arise naturally in the schools. These problems are first attacked directly with reference to the historical development, then standard calculus techniques are applied. Primarily for prospective secondary school teachers.

302. MATHEMATICAL METHODS IN ENGINEERING I. Class 3, cr. 3. Prerequisite: MA 262.

Determinants and matrices, the solution of systems of linear equations, dimensional analysis, complex numbers, Fourier series, interpolation, numerical integration, series solution of differential equations, Bessel-Fourier expansions, the Laplace transform with applications.

318. INTRODUCTORY PROBABILITY THEORY AND NUMERICAL ANALYSIS. Class 3, cr. 3. Prerequisite: MA 262. May not be used for a major in mathematics.

An introductory treatment to probability theory, including probability axioms, density functions, distribution functions, moments, bivariate distributions and the normal distribution with emphasis on the engineering applications. Applications of numerical analysis to provide computer methods of solution for engineering problems. All introduction to means for transforming repetitive and other complex hand methods to machine solution.

351. ELEMENTARY LINEAR ALGEBRA. Class 3, cr. 3. Prerequisite: MA 261.

Systems of linear equations, finite dimensional vector spaces, matrices, determinants, applications to analytic geometry.

361. ADVANCED CALCULUS AND DIFFERENTIAL EQUATIONS. Class 3, cr. 3. Prerequisite: MA 261.

Real number system, functions, sequences, limits, continuity, theory of differentiation and integration.

362. TOPICS IN ADVANCED CALCULUS. Class 3, cr. 3. Prerequisite: MA 441.

Elementary topology of n-space. Continuity. Partial derivatives. Total differential. Taylor's theorem. Jacobians, Implicit functions. Transformations and their inverses. Extreme values. Multiple integrals. Change of variables. Line and surface integrals. Stokes theorem.

421. DIFFERENTIAL EQUATIONS. Class 3, cr. 3. Prerequisite: differential and integral calculus. Not open to students with credit in MA 422.

Derivation and solution of differential equations for problems in applied fields.

422. DIFFERENTIAL EQUATIONS FOR ENGINEERING AND THE PHYSICAL SCIENCES. Class 3, cr. 3. Prerequisite: MA 262. Not open to students with credit in MA 421.

Derivation and solutions of additional types of differential equations for problems in science and engineering.

441. **FOUNDATIONS OF ANALYSIS.** Class 3, cr. 3. Prerequisite: MA 261.

Real number system, functions, sequences, limits, continuity, theory of differentiation and integration.

453. **ALGEBRA I.** Class 3, cr. 3. Prerequisite: MA 351, or consent of instructor.

454. **ALGEBRA II.** Class 3, cr. 3. Prerequisite: MA 453. Math 453 and 454 are primarily for mathematics majors. The topics discussed are:

Fundamental properties of groups, rings, integral domains, fields. Homomorphisms. Abelian groups and modules. Polynominals, solution of algebraic equations, field extensions. Vector spaces, linear transformations and their decomposititon. Inner product spaces, characteristic values.

490. **TOPICS IN MATHEMATICS FOR UNDERGRADUATES.** Cr. 1 to 5.

Supervised reading and reports in various fields. Open only to students with the consent of the division.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

501. **TECHNIQUES OF APPLIED MATHEMATICS I.** Class 3, cr. 3. Prerequisite: MA 262 or equivalent.

This is strictly a methods course. MA 501, 502 are inadequate substitutes for MA 510 and/or 511 where the latter are used as prerequisites. MA 501, 502 are not acceptable for graduate credit in some engineering programs.

Matrices, determinants, complex functions; Fourier series, harmonic analysis; numerical methods.

502. **TECHNIQUES OF APPLIED MATHEMATICS II.** Class 3, cr. 3. Prerequisite: MA 501.

Continuation of MA 501. Gamma, Beta, and Bessel functions, elliptic integrals; vector algebra and calculus; solution of Laplace, wave, and heat equations by Fourier and Fourier-Bessel series; Laplace transform.

510. **ADVANCED CALCULUS.** Class 3, cr. 3. Prerequisite: MA 262 or equivalent.

Functions of several variables; partial derivative, differential; quadratic approximation, extrema; vector calculus, gradient; line, surface, and volume integrals; divergence, curl, Laplacian, integral, theorems; mappings, continuity, differentiability, inverse mapping; implicit functions; orthogonal coordinates; weight function, Stielties integral, delta-measure.

511. **LINEAR ANALYSIS.** Class 3, cr. 3. Prerequisite or corequisite: MA 510. (MA 511 and MA 515, without MA 510, constitute a possible minor for special groups of M.S. candidates.)

Vector spaces; linear transformations, matrices, determinants; linear algebraic systems, linear differential systems; linear difference equations, linear integral equations; linear inequalities, convex regions, simplex methods.

523. **INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS.** Class 3, cr. 3. Prerequisites: MA 510 and MA 422 or equivalent.

Method of characteristics for quasilinear first-order equations; complete integral; Cauchy-Kowalewsky theory; classification of second-order equations in two variables; canonical forms; difference methods for hyperbolic and parabolic equations; Poisson integral method for elliptic equations.

525. **INTRODUCTION TO COMPLEX ANALYSIS.** Class 3, cr. 3. Prerequisite: MA 510.

Complex numbers and complex-valued functions; differentiation of complex functions; power series, uniform convergence; integration, contour integrals; elementary conformal mapping.

538. **PROBABILITY THEORY I.** Sem. 1. Class 3, cr. 3. Corequisite: MA 544.

Measure-theoretic foundations of probability theory; probability spaces and random variables; independence; Borel-Cantelli lemma and Kolmogorov zero-one law; classical convergence theorems for sums of independent random variables; expectation (the Lebesgue integral); law of large numbers.

539. **PROBABILITY THEORY II.** Sem. 2. Class 3, cr. 3. Prerequisite: MA 538.

Kolmogorov consistency theorem; distribution functions and characteristic functions; convergence of sums of independent random variables; law of the iterated logarithm; infinitely divisible laws and stable laws; the central limit problem plus Berry-Essen remainder theorem; conditional expectation.

547. **ANALYSIS FOR TEACHERS I.** Class 3, cr. 3. Prerequisite: MA 261.

Inequities, sequences, functions, limits. Application to such basic concepts as length and area and their implications for the teacher of mathematics.

548. **ANALYSIS FOR TEACHERS II.** Class 3, cr. 3. Prerequisite: MA 547.

Elementary functions and basic theorems of calculus.

549. **CALCULUS FOR TEACHERS.** Class 3, cr. 3. Prerequisite: MA 261.

A critical study of the basic concepts of analytic geometry and calculus with applications. Designed for secondary school teachers.

550. **ALGEBRA FOR TEACHERS I.** Class 3, cr. 3. Prerequisite: MA 351 or graduate standing. May not be used for a major in mathematics.

Definitions and elementary properties of groups, rings, integral domains, fields, vector spaces, and matrices, with major emphasis on the rings of integers, rational numbers, complex numbers and polynomials. Intended primarily for secondary school teachers.

551. **ALGEBRA FOR TEACHERS II.** Class 3. cr. 3. Prerequisite: MA 550.

A continuation of MA 550.

553. **INTRODUCTION TO ABSTRACT ALGEBRA.** Class 3, cr. 3. Prerequisite: MA 453.

Basic properties of groups, rings, integral domains, fields, polynomials. Solvable groups. Finitely generated abelian groups. Algebraic and transcendental field extensions. Separable extensions. Normal extensions, Galois theory.

556. **INTRODUCTION TO THE THEORY OF NUMBERS.** Class 3, cr. 3. Prerequisite: MA 261.

Divisibility, congruences, quadratic residues, Diophantine equations, the sequence of primes.

560. **FUNDAMENTAL CONCEPTS OF GEOMETRY.** Class 3, cr. 3. Must be preceded by MA 261.

Foundations of Euclidean geometry, including a critique of Euclid's "Elements" and a detailed study of an axiom system such as that of Hilbert. Independence of the parallel axiom and introduction to non-Euclidean geometry.

561. **PROJECTIVE GEOMETRY.** Class 3, cr. 3. Prerequisite: MA 261.

Ideal elements, duality, harmonic sets, projective metric, theory of conics, involution, imaginary elements.

563. **ADVANCED GEOMETRY.** Class 3, cr. 3. May not be used for a major in mathematics.

A critique of Euclid's elements and a detailed study of Hilbert's postulates with an introduction to non-Euclidean geometry. Primarily for prospective secondary school teachers.

571. **ELEMENTARY TOPOLOGY.** Class 3, cr. 3. Prerequisite: MA 442.

General topological spaces and continuity. Connectedness. Separation. Compactness. Metric spaces. Function spaces. Homotopy; the fundamental group.

581. **INTRODUCTION TO LOGIC FOR TEACHERS.** Class 3, cr. 3. Prerequsites: MA 441 and MA 351 or MA 511.

Boolean algebra, propositional calculus, first order functional calculus; formal languages; many-valued logics, model logics, intuitionism.

583. **HISTORY OF ELEMENTARY MATHEMATICS.** Class 3, cr. 3. Prerequisites: MA 550, MA 563.

A survey of the major developments of mathematics through the eighteenth century, with selected topics from more recent mathematics, including non-Euclidean geometry and the axiomatic method.

598. **TOPICS IN MATHEMATICS.** cr. 1 to 5.

Directed study and reports for students who wish to undertake individual reading and study on approved topics.

STATISTICS

311. **INTRODUCTORY PROBABILITY.** Class 3, cr. 3. Prerequisite: MA 261 or equivalent.

Descriptive statistics, introduction to probability, moments, the binomial, Poisson and normal distribution, curve fitting, correlation, and some tests of hypotheses.

401. **ELEMENTARY STATISTICAL METHODS I.** Class 3, cr. 3. Prerequisite: College algebra. Not open to students in the Division of Mathematical Sciences and Engineering.

A basic introductory statistics course with applications shown to various fields and emphasis placed on assumptions, applicability, and interpretations of various statistical techniques. Subject matter includes frequency distributions, descriptive statistics, elementary probability, normal analysis of variance, with emphasis on distribution applications, sampling distribution, estimation, hypothesis testing and linear regression.

402. **ELEMENTARY STATISTICAL METHODS II.** Class 3, cr. 3. Prerequisite: STAT 401 or equivalent.

Continuation of STAT 401. Subject matter includes multiple regression and analysis of variance, with emphasis on statistical inference and applications to various fields.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

511. **STATISTICAL METHODS I.** Class 3, cr. 3. Prerequisite: MA 262, or consent of instructor. Not open to students with credit in STAT 501.

Descriptive statistics for one or two variables of measurement, curve fitting, frequency distributions, regression and correlation, statistical inference, application to engineering problems, including control charts and acceptance sampling.

512. **STATISTICAL METHODS II.** Class 3, cr. 3. Prerequisite: STAT 511. Not open to students with credit in STAT 502.

Tests of hypotheses, estimation, analysis of variance, multiple regression and correlation, moments and frequency functions.

513. **APPLICATIONS OF STATISTICS IN INDUSTRY.** Class 3, cr. 3. Prerequisite: STAT 511.

A strong background in control charts and acceptance sampling; continuous sampling plans, sequential analysis, statistics of combinations, and some nonparametric methods.

(538. **PROBABILITY THEORY I.** See MA 538.)

(539. **PROBABILITY THEORY II.** See MA 539.)

551. **INTRODUCTION TO THEORETICAL STATISTICS I.** Class 3, cr. 3. Prerequisite: MA 261 or MA 224.

Inductive behavior, probability, random variables, frequency distributions, statistical hypotheses and their tests.

552. **INTRODUCTION TO THEORETICAL STATISTICS II.** Class 3, cr. 3.

Continuation of STAT 551.

COMPUTER SCIENCES

200. **LABORATORY ON PROGRAMMING FOR DIGITAL COMPUTER.** Class 2, cr. 1. Corequisite: one semester of mathematics beyond MA 151.

Programming of digital computers in a problem-oriented language (FORTRAN). Problems solved will illustrate some of the elementary methods of numerical analysis. The course is intended to prepare the student to use digital computers in later courses in science and engineering.

210. **LABORATORY ON DATA PROCESSING.** SS. Class 3, cr. 3. Corequisite: MA 151. Not open to students with credit in CS 200 or 220.

Programming of digital computers using problem-oriented languages (COBOL and FORTRAN). Problems will be selected from the areas of data processing and non-numerical applications. The course is intended to prepare tthe student to use computers in later courses in the nonphysical sciences.

400. **INTRODUCTION TO PROGRAMMING FOR DIGITAL COMPUTERS.** Class 3, cr. 3. Prerequisite: CS 200 or equivalent.

Stored program digital computers; programming in problem-oriented and machine-oriented languages; pseudo-operations, system macro-instructions, programmer defined macroinstructions; solution of non-numerical problems.

414. **INTRODUCTION TO NUMERICAL ANALYSIS.** Class 3, cr. 3. Prerequisite: MA 261; corequisite: CS 200 or equivalent knowledge of programming.

Iterative methods for solving nonlinear equations; direct and iterative methods for solving linear systems; approximations of functions, derivatives and integrals; error analysis.

590. **TOPICS IN COMPUTER SCIENCES.** Class 1-5, cr. 1 to 5.

Directed study for students who wish to undertake individual reading and study on approved topics.

PHYSICS

Professor King in charge, Lafayette

Professor Pan, Departmental Representative, Calumet

UNDERGRADUATE LEVEL

Lower-Division Courses

152. **MECHANICS AND SOUND.** Sem. 1 and 2. SS. Class 4, Lab. 2, cr. 4. Prerequisite or corequisite: MA 162.

Statics; uniform and accelerated motion; Newton's laws; circular motion; energy, momentum, and conservation principles; dynamics of rotation; gravitation and planetary motion; properties of matter; simple harmonic and wave motion; sound.

200. **OUTLINE OF PHYSICS.** Class 3, Lect. Dem. 1, Lab. 2, cr. 4. (3 H).

General physics for students in home economics.

205. **SURVEY OF PHYSICS.** Class 3, Lab. 2, cr. 4. Prerequisite: MA 111 or equivalent.

General physics for students of agriculture and forestry.

210. **THE NATURE OF PHYSICAL SCIENCE I.** Sem. 1. SS. Class 2, Lab. 3, cr. 3. (op. 3 HU).

Development of basic concepts and theories in physical science; a terminal course.

211. **THE NATURE OF PHYSICAL SCIENCE II.** Sem. 2. Class 2, Lab. 3, cr. 3. Prequisite: PHYS 210 or equivalent.

Continuation of PHYS 210. PHYS 210 and 211 will satisfy the physical science requirement in the School of Humanities, Social Science, and Education.

218. **GENERAL PHYSICS.** Sem. 1. Class 4, Lab. 2, cr. 4. Prerequisite: MA 111 and 112, or 123 and 124.

Mechanics, heat, and sound for students specializing in physics.

219. **GENERAL PHYSICS.** Sem. 2. Class 4, Lab. 2, cr. 4. Prerequisite: PHYS 218.

Electricity, light, and modern physics for students not specializing in physics.

220. **GENERAL PHYSICS.** Sem. 1 and 2. SS. Class 3, Lab. 2, cr. 4.

Prerequisite: MA 111 and 112, or 123 and 124.

Mechanics, heat, and sound for students not specializing in physics.

221. **GENERAL PHYSICS.** Sem. 1 and 2. Class 3, Lab. 2, cr. 4. Prerequisite: PHYS 220.

Electricity, light, and modern physics for students not specializing in physics.

241. **ELECTRICITY AND OPTICS.** Sem. 1 and 2. Class 4, cr. 3. Prerequisite: PHYS 152.

Electrostatics, current electricity, electromagnetism, magnetic properties of matter. Electromagnetic waves, geometrical and physical optics.

251. **HEAT, ELECTRICITY, AND OPTICS.** Sem. 1 and 2. Class 5, Lab. 2, cr. 5. Prerequisite: PHYS 152.

Heat, kinetic theory, elementary thermodynamics, heat transfer. Electrostatics, current electricity, electromagnetism, magnetic properties of matter; geometrical and physical optics.

261. **ELECTRICITY AND OPTICS.** Sem. 1 and 2. Class 5, cr. 4. (3 EE). Prerequisite: PHYS 152; prerequisite or corequisite: EE 201.

Electricity and magnetism with emphasis on fields and the use of vector analysis; geometrical and physical optics.

UNDERGRADUATE LEVEL

Upper-Division Courses

310. **INTERMEDIATE MECHANICS.** Class 4, cr. 4. (el. S). Prerequisite: MA 261 and two terms of general physics.

For students familiar with calculus. Elements of vector algebra; statics of particles and rigid bodies; theory of couples; principle of virtual work; kinematics; dynamics of particles and rigid bodies; work, power, and energy; elements of hydromechanics and elasticity.

322. **OSCILLATIONS AND WAVES.** Class 3, cr. 3. Prerequisite: PHYS 251 or equivalent.

Modes of vibration of a system; emission and absorption of waves; properties of sound, electromagnetic, and particle waves including phenomena of refraction, reflection, dispersion, diffraction, interference, polarization, and double refraction.

330. **INTERMEDIATE ELECTRICITY AND MAGNETISM.** Class 3, cr. 3. Prerequisites: PHYS 251 or equivalent; prerequisite or corequisite: MA 262.

Electrostatics; electric currents; magnetostatics; electromagnetic induction; Maxwell's equations; electromagnetic waves.

342. MODERN PHYSICS. Sem. 1 and 2. Class 4, cr. 3. (5 ENGR, op. S.) Prerequisite: PHYS 241 or 251 or 261.

A survey of basic concepts and phenomena in atomic, nuclear, and solid state physics.

342L. MODERN PHYSICS LABORATORY. Sem. 1 and 2. Lab. 2, cr. 1.

Laboratory experiments to accompany PHYS 342.

350. INTERMEDIATE LABORATORY I. Class 1, Lab. 3, cr. 2. Prerequisite or corequisite: PHYS 322.

Lectures on geometrical optics; instructor demonstrations and student experiments involving mechanical and electromagnetic wave and oscillation phenomena.

351. INTERMEDIATE LABORATORY II. Class 1, Lab. 3, cr. 2. Prerequisite or corequisite: PHYS 330 or 430.

Lectures on AC circuit theory, instructor demonstrations and student experiments involving particle diffraction, wave polarization, double refraction, AC circuits, and meters.

352. INTERMEDIATE LABORATORY III. Class 1, Lab. 3, cr. 2. Prerequisite: PHYS 351 and 342 or 344.

Lectures and experiments on electromagnetic wave guides for wavelengths from the microwave to radio region, photoelectric effect, energy levels in atoms, magnetic susceptibility, Compton Effect, nuclear line spectra, nuclear magnetic resonance.

470. READING IN SPECIAL TOPICS. cr. 1-3. Admission by special arrangement with instructor.

Reading and reports on topics of special importance in the programs of individual students.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

500. FUNDAMENTAL PHYSICS I. Class 1, Lec. Dem. 2, cr. 2. Prerequisite: a course in college physics. Admission by consent of instructor.

An intensive review of mechanics, wave motion and kinetic theory and the extensions of the laws in these domains to relativity and current investigations and applications. The course is specifically designed for teachers of science in the secondary schools.

503. FUNDAMENTAL CONCEPTS OF PHYSICS. Class 3, cr. 3. (Offered at the Regional Campuses.) Prerequisite: a course in college physics. Admission by consent of instructor.

An intensive review of the principles of physics specifically designed for teachers of the physical sciences in high school. Special emphasis will be placed on mechanics, kinetic theory, electric and magnetic fields, and the propagation of electromagnetic radiation.

504. PRINCIPLES OF PHYSICS I. Class 2, cr. 2. Prerequisite: college physics and mathematics through calculus.

A review of classical physics, with emphasis on the unifying principles operating in the various domains. Stress will be placed on the operational approach, the conservation principles, and the field theory law of gravitation and electromagnetism. Designed primarily for secondary school teachers.

506. FUNDAMENTAL PHYSICS II. Class 1, Lec. Dem. 2, cr. 2. Prerequisite: PHYS 500 or equivalent.

An intensive review of electricity, magnetism and light, and an introduction to quantum phenomena and atomic and nuclear structure. The course is specifically designed for teachers of science in the secondary schools.

508. INTRODUCTION TO THEORETICAL PHYSICS I. Class 3, cr. 3. Prerequisite or corequisite: PHYS 504.

Vector algebra and calculus; dynamics of particles and rigid bodies; gravitation and planetary motion; oscillations and waves; thermodynamics. Designed primarily for secondary school teachers.

509. INTRODUCTION TO THEORETICAL PHYSICS II. Class 3, cr. 3. Prerequisite: PHYS 508 or equivalent.

Kinetic theory and statistical mechanics; electromagnetism and Maxwell's equations; physical optics; wave mechanics. Designed primarily for secondary school teachers.

515. THERMODYNAMICS. Class 3, cr. 3. Prerequisites: PHYS 310 and 330 and a course in differential equations or advanced calculus.

Fundamental concepts of heat; theory and practice of heat measurements; first and second laws of thermodynamics, with applications.

517. STATISTICAL PHYSICS. Class 3, cr. 3. Should be preceded by PHYS 342, 510 and 515, or equivalent.

Kinetic theory of gases, third law of thermodynamics, and the principles of statistical mechanics, with applications to the quantum theory of radiation and the theory of specific heats.

530. **ELECTRICITY AND MAGNETISM.** Class 3, cr. 3. (el.). Prerequisite: PHYS 330 or equivalent.

An introductory theoretical course. Vector analysis; electrostatic problems; theory of dielectrics; theory of conduction; thermoelectric and photoelectric phenomena; electromagnetic effects due to steady and changing currents; magnetic properties of matter; Maxwell's equations; radiation.

542. **SURVEY OF MODERN PHYSICS I.** Class 3, cr. 3. Prerequisites: general physics and calculus. Restricted for graduate credits to candidates in education or science teaching.

Elementary particles. Relativity. Quantum theory. Atomic spectra and X-rays. Pauli principle. Wave mechanics. Radiation and statistics.

545. **SOLID STATE PHYSICS.** Class 3, cr. 3. Prerequisite: PHYS 550 or equivalent.

Crystal structure; lattice vibrations and electronic band structure of crystals; electrical, optical and thermal properties of solids; transport and other nonequilibrium phenomena in uniform and nonuniform materials.

549. **SURVEY OF MODERN PHYSICS II.** Sem. 2. SS. Class 3, cr. 3. Prerequisite: PHYS 342 or PHYS 542 or equivalent.

Solid state physics; nuclear particles and forces; natural and artificial radioactivity; particle accelerators; nuclear reactions; fission and fusion. Designed primarily for secondary school teachers.

550. **INTRODUCTION TO QUANTUM MECHANICS.** Sem. 1 and 2. Class 3, cr. 3. Should be preceded by PHYS 342 and at least one other junior-level course in each of mathematics and physics or equivalent.

Brief historical survey of the development of quantum mechanics, waves in classical physics, wavepackets, uncertainty principle, wavefunctions, operators, expectation values of dynamical observables, Schrödinger equation, application of Schrödinger equation to one-dimensional problems, the hydrogen atom, electron spin, multi-electron atoms, periodic table, molecules.

556. **INTRODUCTORY NUCLEAR PHYSICS.** Sem. 2, Class 3, cr. 3. Prerequisite: PHYS 550 or equivalent.

Theory of relativity, brief survey of systematics of nuclei and elementary particles, structure of stable nuclei, radioactivity, interaction of nuclear radiation with matter, nuclear reactions, particle accelerators, nuclear instruments, fission, nuclear reactors.

564. **INTRODUCTION TO ELEMENTARY PARTICLE PHYSICS.** Sem. 2. Class 3, cr. 3. Must be preceded by PHYS 550 or 552 or equivalent.

Historical survey of the discovery of elementary particles. Methods of detecting charged particles. Modern particle accelerators. Kinematics and quantum mechanics of scattering and decay of particles; conservation of four-momentum and angular momentum; phase space. Charge structure of particles; form factors. Strong interactions; resonances in pion-nucleon and pion-pion systems; effective mass, Dalitz, and Chew-Low plots; qualitative introduction to Feynman diagram techniques in single particle exchange processes; T.C.P. invariance; isospin; strangeness; G-parity; Gell-Mann Nishijima formula. Electromagnetic and weak interactions; violation of strong interaction symmetries, Interpretation of particle spectra in terms of SU (3) symmetry, the quark model and Regge theory.

590. **READING AND RESEARCH.** Sem. 1 and 2, cr. 1 to 3.

School of Technology

Dean McNelly in charge, Lafayette

DIVISION OF APPLIED SCIENCE

The University has a number of two-year undergraduate programs leading to the Degree of Associate in Applied Science. The work offered in these programs is of University grade as are all undergraduate courses, but the offerings are much more applied in nature.

The associate degree is awarded to each student who satisfactorily completes the program of study in one of the curricula. Graduates can expect to be immediately employable in industry. They may be admitted to the new third- and fourth-year curricula specifically designed to lead a Bachelor of Science degree especially for engineering technicians. Or, such graduates may be admitted to the curricula leading to a degree of Bachelor of Science in Industrial Education.

The Nature of Applied Science

Scientific and technological complexity ranges over a broad spectrum, from extremely simple to highly complex and abstract activity. At one extreme are the pure scientist and the engineering scientist; at the other, the mechanic, the craftsman, and the service personnel.

The Engineer. The 33rd Annual Report of the Engineering Council for Professional Development, Sept. 30, 1965, defines engineering as "the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefit of mankind."

The Engineering Technician. The National Society for Professional Engineers has approved this definition of the engineering technician provided by the Board of the Institute for the Certification of Engineering Technicians:

"An engineering technician is one who, in support of and under the direction of professional engineers or scientists, can carry out in a responsible manner either proven techniques which are common knowledge among those who are technically expert in a particular technology, or those techniques especially prescribed by professional engineers.

"Performance as an engineering technician requires the application of principles, methods, and techniques appropriate to a field of technology, combined with practical knowledge of the construction, application, properties, operation, and limitations of engineering systems, processes, structures, machinery, devices, or materials, and, as required, related manual crafts, instrumental, mathematical, or graphic skills.

"Under professional direction an engineering technician analyzes and solves technological problems, prepares formal reports on experiments, tests, and other similar projects or carries out functions such as drafting, surveying, technical sales, advising consumers, technical writing, teaching or training. An engineering technician need not have an education equivalent in type, scope, and rigor to that required of an engineer; however, he must have a more theoretical education with greater mathematical depth, and experience over a broader field than is required of skilled craftsmen who often work under supervision."

The Skilled Craftsman. The work of the engineer and the technician would be meaningless without the contribution of the skilled craftsman who carries out engineering ideas. A toolmaker, for example, fabricates a jig or die from a design conceived by the engineer and detailed by the technician. The electrician, pipefitter, welder, machinist, chemical operator, and surveyor's rodman likewise use their skills to carry out the work of the Engineering team.

Need. Our present space age, with its exploding accumulation of new information and scientific discovery, has increased the need for people with specialized training in science and technology. Experts have recently estimated that our nation's engineering schools must graduate twice the present 35,000 engineers per year if we are to meet the expanding needs.

Since it now appears improbable that our nation will be able to attain the goal of 70,000 to 80,000 engineers per year another approach to the problem is necessary. The most reasonable solution appears to be one of making the present professional engineer more efficient by providing him with assistance in the form of an engineering technician. Many experts believe that there should be a ratio of from three to five engineering technicians for each engineer. This would indicate that 100,000 to 150,000 engineering technicians should be trained per year.

Currently the United States has only about 16,000 graduates of engineering technology programs coming on the job market each year. This simply means there is a large, unsatisfied demand for engineering technicians. The opportunities in this field are virtually unlimited.

Developed With Industrial Cooperation

Various courses are offered to cover the basic knowledge and practices of present-day industry. Industrial leaders have been consulted to learn the kind of specific technical information required by persons who take jobs in industry. Many members of the instructional staff are drawn from local industries, but course administration, teaching material, and standards of instruction are under the direction of the departments involved.

Programs

The applied science programs consist of:

1. *Day programs.* These programs are primarily for students with little or no industrial experience—directly out of high school or military service. They are of two years' duration and lead to the degree of Associate in Applied Science in the curriculum studied. Students admitted to these programs are classified as regular students.
2. *Evening programs.* These programs are planned to serve industrial employees or others who, because of many reasons, cannot attend day school programs. These include:
   - (a) *Programs* in the selected fields of technology which lead to the degree of Associate in Applied Science. Students admitted to these programs are classified as regular students.
   - (b) *Certificate programs* have been designed for the more mature adult either in industrial employment already, or desiring technical industrial employment. They are designed to be as concentrated and immediately practical as possible for students who have limited time or funds available for formal education.
   - (c) *Special service programs.* The Division of Applied Technology cooperates with individual industries or communities in the development and operation of specialized training programs. Such service is rendered without charges other than the regular fees assessed for student enrollment in classes.

ARCHITECTURAL TECHNOLOGY

This curriculum is designed to prepare students for technological employment with contractors, building materials suppliers, architects, civil engineers, and related governmental agencies.

Graduates are prepared to accept positions as estimators, expeditors, planning technicians, field inspectors, architectural detailers, architectural draftsmen, and sales representatives. With experience, after completing this program of study, graduates are now holding positions as field engineers, technical engineers, junior structural engineers, engineering assistants, shop superintendents, and real estate brokers. This field of specialization is well designed to help the student who is interested in going into the construction business for himself.

FRESHMAN YEAR

First Semester

(2) ART 118 (Architectural Projections)
(2) ART 120 (Freehand Drawing I)
(2) ART 172 (Systems of Construction)
(3) CET 104 (Elementary Surveying)
(5) MA 151A (Elementary Mathematics for Engineering and the Physical Sciences)
(3) SOC 100 (Introductory Sociology)
(18)

Second Semester

(2) ART 121 (Freehand Drawing II)
(3) ART 150 (Architectural Construction I)
(2) ART 164 (Building Materials)
(3) CET 160 (Statics)
(4) GNT 136 (Physics: Mechanics and Heat)
(3) ENGL 101 (English Composition I)
(17)

SOPHOMORE YEAR

Third Semester

(3) ART 222 (Architectural Construction II)
(2) ART 276 (Specifications and Contract Documents)
(3) ART 284 (Mechanical Equipment for Buildings)
(3) CET 260 (Strength of Materials)
(4) GNT 176 (Physics: Electricity, Sound, and Light)
(3) SPE 114 (Fundamentals of Speech Communication)
(18)

Fourth Semester

(3) ART 210 (History of Architecture)
(3) ART 224 (Architectural Constructiton III)
(3) ART 280 (Quantity Survey)
(3) CET 266 (Materials Testing)
(3) IS 268 (Elements of Law)
(3) GNT 220 (Technical Report Writing)
(18)

CHEMICAL TECHNOLOGY

This two year college-level program in chemical technology is designed to train persons for employment in the chemical and allied products industries. This training will enable the technician to assist a chemist, chemical engineer or plant supervisor to develop procedures, make technical measurements, develop research models and operate a chemical process or plant. Upon successful completion of the program the degree of Associate in Applied Science will be granted.

Two options are available: pharmaceutical (Indianapolis Campus) and process development (Calumet Campus). In the Calumet Region of Indiana and Illinois greater opportunities are presented to those choosing the general industrial option. The person who has chosen the pharmaceutical option will find ample opportunities for employment in the greater Chicago, Indianapolis and South Bend-Elkhart areas. At present, the demand for chemical technicians far exceeds the supply. Each year many companies come to the Calumet Campus seeking persons qualified in Chemical Technology.

FRESHMAN YEAR

First Semester

(4) CHT 109 (General Chemistry)
(5) MA 151A (Elementary Mathematics for Engineering and the Physical Sciences)
(3) ENGL 101 (English Composition I)
(4) IET 104 (Industrial Organization and Production)
(1) ENGL 185 (Developmental Reading)

(17)

Second Semester

(4) CHT 212 (Industrial Chemistry: Qualitative)
(3) MA 223A (Introductory Analysis I)
(4) PHYS 220 (General Physics)
(3) POL 101 (Introduction to Government)
(3) SPE 114 (Fundamentals of Speech Communication)

(17)

SOPHOMORE YEAR

Process Option

Third Semester

(3) CHT 273 (Introduction to the Physical Chemistry of Materials)
(4) CHT 252 (Industrial Chemistry: Quantitative)
(4) PHYS 221 (General Physics)
(3) MA 224A (Introductory Analysis II)
(3) CHT 201 (Unit Operatitons I)

(17)

Fourth Semester

(4) CHT 225 (Quantitative Analysis: Instrumental)
(3) GNT 220 (Technical Report Writing)
(3) PSY 370 (Psychology in Business and industry)
(3) CHT 202 (Unit Operations II)
(5) CHT 251 (Organic Chemistry)

(18)

CIVIL ENGINEERING TECHNOLOGY

This program is designed to prepare students for employment with land surveyors, highway departments, contractors, city engineering offices, railroads, and engineering consultants, as well as in other specializations of civil engineering technology.

Graduates of this program accept positions as technicians in the offices of contractors, city engineers, and professional engineers; as topographers, structural draftsmen, and steel and concrete laboratory technicians; and as instrument men with land surveys, property surveys, and highway surveys. With additional experience students may acquire positions as supervisors, or chiefs of parties, in a variety of work associated with civil engineering.

Graduates may also continue their education by pursuing a Bachelor of Science degree with a major in construction technology.

FRESHMAN YEAR

First Semester

(3) CET 104 (Elementary Surveying)
(3) EG 110 (Drafting Fundamentals)
(1) MET 100 (Applied Engineering Computations)
(5) MA 151A (Elementary Mathematics)
(4) GNT 136 (Physics: Mechanics and Heat)
(3) Social Science Elective

(19)

Second Semester

(3) CET 160 (Statics)
(3) CET 208 (Route Surveying)
(3) ART 150 (Architectural Construction I)
(3) MA 223A (Introductory Analysis I)
4) GNT 176 (Physics: Electricity, Sound and Light)
(3) ENGL 101 (English Composition I)

(18)

SOPHOMORE YEAR

Third Semester

(3) CET 209 (Land Surveying and Sub-division)
(3) CET 253 (Hydraulics and Drainage)
(3) CET 260 (Strength of Materials)
(2) ART 276 (Specifications and Contract Documents)
(3) MA 224A (Introductory Analysis II)
(3) SPE 114 (Fundamentals of Speech Communication)

(17)

Fourth Semester

(3) CET 266 (Materials Testing)
(3) CET 280 (Structures I)
(3) ART 280 (Quantity Survey)
(3) IS 268 (Elements of Law)
(3) GNT 220 (Technical Report Writing)
(3) Technical Elective

(18)

COMPUTER TECHNOLOGY

This two-year associate degree program is designed to produce a graduate in the occupation group that begins with the computer programmer in either the commercial or technical area, depending on which of the two options is selected.

This curriculum is designed to prepare a person able to perform the following functions: analyze problems initially presented by a systems analyst with respect to the type and extent of commercial or scientific data to be processed, the method of processing to be employed, and the format and extent of the final results. Design detailed flowcharts and computer programs giving the computations involved and the sequences of computer and other machine operations necessary to edit and input the data, process it, and edit and output information. Correct program errors and determine the causes of machine stoppage. Verify the accuracy and completeness of computer programs by preparing sample data and testing it on the computer. Evaluate and modify existing programs to take into account changed requirements. Confer with technical personnel with respect to planning new or altered programs. Prepare full documentation with respect to procedures on the computer and other machines and on the content of the computer programs and their full usage. Devise more efficient methods for the solution of commercial or scientific problems. Comprehend the major concepts, types of equipment and programming systems related to electronic data processing. Be familiar with common commercial and business procedures or with common scientific and engineering procedures.

Purdue University provides a course of instruction in computer technology leading to the degree of Associate in Applied Science in either the commercial or the technical option.

This two-year program was developed in cooperation with the division of vocational education, Indiana Department of Public Instruction. The two options available are:

1. Commercial option—for accountants, office managers, adults, and recent high school graduates interested in careers in business data processing.
2. Technical option—for scientists, engineers, technicians, adults, and recent high school graduates interested in careers in scientific data processing.

Commercial Option

FRESHMAN YEAR

First Semester

(3) CPT 101 (Introduction to Computers)
(3) CPT 111 (Unit Record Data Processing)
(1) ENGL 185 (Developmental Reading)
(5) MA 151A (Elementary Math for Engineering and the Physical Sciences)
(3) SPE 114 (Fundamentals of Speech Communication)

(15)

Second Semester

(3) CPT 122 (Computer Math)
(3) CPT 131 (Assembly Language Programming I)
(3) ENGL 101 (English Composition I)
(3) IET 104 (Industrial Organization)
(3) INDM 200 (Introductory Accounting)

(15)

SOPHOMORE YEAR

Third Semester

(3) CPT 132 (Assembly Language Programming II)
(3) CPT 225 (Statistical Methods)
(3) CPT 254 (Commercial Systems Applications)
(3) CPT 264 (Compiler Language Programming I)
(3) INDM 201 (Cost Accounting)
(3) Elective

(18)

Fourth Semester

(3) CPT 265 (Compiler Language Programming II)
(3) CPT 284 (Utility Programs)
or
(3) CPT 285 (Computer Operating Systems I)
(1) CPT 294 (Computer Seminar and Field Trips)
(3) ECON 210 (Principles of Economics)
(3) GNT 220 (Technical Report Writing)
(3) Elective

(16)

Technical Option

FRESHMAN YEAR

First Semester

(3) CPT 101 (Introduction to Computers)
(3) CPT 111 (Unit Record Data Processing)
(1) ENGL 185 (Developmental Reading)
(5) MA 151A (Elementary Mathematics for Engineering and Physical Sciences)
(3) SPE 114 (Fundamentals of Speech Communication)

(15)

Second Semester

(3) CPT 122 (Computer Mathematics)
(3) CPT 131 (Assembly Language Programming I)
(3) ENGL 101 (English Composition I)
(3) IET 104 (Industrial Organization)
(4) PHYS 220 (General Physics)

(16)

SOPHOMORE YEAR

Third Semester

(3) CPT 132 (Assembly Language Programming II)
(3) CPT 225 (Statistical Methods)
(3) CPT 264 (Compiler Language Programming I)
(3) MA 223A (Introductory Analysis I)
(4) PHYS 221 (General Physics)
(3) Elective

(19)

Fourth Semester

(3) CPT 220 (Numerical Methods I)
(1) CPT 294 (Computer Seminar and Field Trips)
(3) ECON 210 (Principles of Economics)
(3) GNT 220 (Technical Report Writing)
(3) MA 224A (Introductory Analysis II)
(3) Elective

(16)

ELECTRICAL ENGINEERING TECHNOLOGY

The Electrical Engineering Technology programs are designed to prepare students for technological employment with electrical communication industries; light and power industries; manufacturers of electrical equipment; and electrical suppliers and distributors; or with an industry where electrical power and controls are utilized.

General emphasis in this program is placed upon understanding the fundamental principles of electricity and their present-day applications, with special consideration given to modern developments in communications, automation, and industrial practices.

Also included are courses dealing with the fundamentals of industrial management and with some of the historical, economic, and human relations aspects of our American industrial life—all related to the individual .

Within their own specialized areas, students may accept positions as electrical draftsmen, estimators, inspectors, salesmen, checkers, analysts, testers, technical writers, engineer assistants, or research engineers.

After experience and continued growth in their fields, graduates are now holding such positions as supervisors, managers, sales engineers, customer engineers, contractors, field engineers, and application engineers.

Students who obtain the degree of Associate in Applied Science are eligible for consideration for admission to curricula leading to the degree of Bachelor of Science in Technology. Approximately two additional years of study are necessary to complete the requirements for this degree.

FRESHMAN YEAR

First Semester

(3) EET 101 (Electrical Circuits I)
(2) EET 103 (Electronics I: Vacuum Tubes and Transistors)
(2) EET 113 (EET Laboratory I)
(5) MA 151A (Elementary Mathematics for Engineering and the Physical Sciences)
(3) ENGL 101 (English Composition I)
(3) Nontechnical Elective

(18)

Second Semester

(3) EET 151 (Electrical Circuits II)
(3) EET 153 (Electronics II)
(2) EET 163 (EET Laboratory II)
(4) GNT 136 (Physics: Mechanics and Heat)
(3) MA 223A (Introductory Analysis I)
(3) SPE 114 (Fundamentals of Speech Communication)

(18)

SOPHOMORE YEAR

Third Semester

(3) EET 203 (Electronics III)
(3) EET 211 (Electric Machinery)
(2) EET 213 (EET Laboratory III)
(3) MA 224A (Introductory Analysis II) (or nontechnical Elective)
(4) GNT 176 (Physics: Electricity, Sound, Light)
(3) Technical Elective

(18)

Fourth Semester

(3) EET 253 (Electronics IV)
(1) EET 263 (EET Laboratory IV)
(2) EET Specialty Laboratory
(3) EG 110 (Drafting Fundamentals)
(6) Nontechnical Elective
(3) Technical Electives

(18)

FOOD SERVICE TECHNOLOGY

This curriculum has been designed to prepare men and women for supervisory positions in food service establishments. Emphasis is on the technique of quality food service. Instruction will be provided in such fundamentals as business control methods, food production, purchasing, merchandising, employee training, and sanitation. The program combines technical food service management courses and general education courses that lead to an Associate Degree in Applied Science.

Actual work experience in a food service enterprise is part of the management training after the first two semesters are completed. This in-service training will broaden the students' understanding of the operation of a food service business. The feeling of confidence and self-reliance which grows out of such practical contacts is a valuable asset to the student.

Graduates can expect attractive positions from a large variety of food service operations. Middle management, supervisory, and training positions are available in cafeterias, hotel-motel dining rooms, hospitals, automatic vending operations, franchised operations, and school and college food services.

Upon completion of this program, the graduate is immediately employable. Those who wish to continue study toward a B.S. degree are eligible for consideration for admission to the four-year Restaurant-Institutional Management curriculum. About two years additional study are necessary to meet the requirements for this degree.

FRESHMAN YEAR

First Semester

(2) BIOL 201 (Biology of Man)
(3) *CHM 119 (General Chemistry)
(3) ENGL 101 (English Composition I)
(3) F&N 303 (Essentials of Nutrition)
(3) *MA 123 (Elementary Concepts of Mathematics I)
(3) SOC 100 (Introductory Sociology)

(17)

Second Semester

(2) BIOL 203 (Biology of Man)
(4) BIOL 221 (Introduction to Microbiology)
(3) ENGL 102 (English Composition II)
(3) F&N 205 (Foods I)
(3) INDM 200 (Introductory Accounting)
(3) PSY 120 (General Psychology)

(18)

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* Students entering this curriculum may enroll in more advanced mathematics and/or chemistry depending upon their performance on achievements tests.

SOPHOMORE YEAR

Third Semester	Fourth Semester
(3) ECON 210 (Principles of Economics)	(1) *INSM 300 (Practicum in Institutional Management)
(4) INSM 337 (Quantity Food Production)	(3) INSM 438 (Equipment for Institutions)
(3) INSM 441 (Institutional Organization and Management)	(3) INSM 320 (Executive Housekeeping)
(2) INSM 440 (Institutional Food Purchasing)	(3) INSM 445 (Food and Labor Cost Control)
(3) PSY 370 (Psychology in Business and Industry)	(3) SPE 114 (Fundamentals of Speech Communication)
(3) Elective	(3) Elective
(18)	(16)

INDUSTRIAL ENGINEERING TECHNOLOGY

This field is designed to develop technicians to support the problem solving and decision making functions in management and to prepare for technological services in such industrial areas as production planning and control, work method analysis, work measurements, quality assurance and controls, and systems and procedures analysis. Practical applications of production-oriented operations, research techniques, data processing, and computer programming fundamentals are stressed. As an industrial engineering technician is concerned with an organization which has human dimensions at least as important as the technical ones this aspect is also stressed throughout the curriculum.

The industrial engineering technician is often initially employed in the time study, quality control, stock control or factory layout department. As he gains experience he may advance within the department directly assisting a professional industrial engineer or become a supervisor. This broad technical background together with the human relations background and a proficiency in engineering and mathematics enables the industrial engineering technician to take advantage of opportunities for advancement in many directions.

The two-year curriculum leads to the degree of Associate in Applied Science. An additional two years of study may lead to a B.S. degree.

The two-year program prepares students to take jobs doing motion study and work simplification, time study and work measurement, quality control and inspection, job evaluation, plant layout, production control, and cost and savings analyses work.

The program of study shown below is designed to give specialized study in methods improvement, materials handling, quality control, production, and general options as selected by the student.

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* The student may enroll for INSM 300 during or between the third and fourth semesters or after the fourth semester.

FIRST YEAR

First Semester

(3) EG 110 (Drafting Fundamentals)
(3) IET 104 (Industrial Organization)
(5) MA 151A (Elementary Mathematics for Engineering and the Physical Sciences)
(1) MET 100 (Applied Engineering Computations)
(4) GNT 136 (Physics: Mechanics and Heat)

(16)

Second Semester

(3) ENGL 101 (English Composition)
(3) IET 204 (Techniques of Maintaining Quality)
(3) CPT 100 (Computer Utilization)
(3) STAT 401 (Elementary Statistical Methods)
(2) MET 335 (Basic Machining)
(4) GNT 176 (Physics: Electricity, Sound and Light)

(18)

SECOND YEAR

Third Semester

(3) ECON 210 (Principles of Economics)
(3) IET 224 (Production Planning and Control)
(3) IET 262 (Motion Study and Work Methods)
(3) IS 152 (Human Relations in Industry) or
PSY 370 (Psychology in Business and Industry)
(2) IET 220 (Critical Path Analysis)
(3) Technical Elective Credit Hours

(17)

Fourth Semester

(3) GNT 220 (Technical Report Writing)
(3) IET 250 (Fundamentals of Production Cost Analysis)
(3) IET 266 (Work Measurement and Incentives)
(3) SPE 114 (Fundamentals of Speech Communication)
(4-6) Technical Electives

(16-18)

TECHNICAL ELECTIVES

Methods Improvement Option

(3) IET 120 (Systems and Procedures)
(2) IET 272 (Job Evaluation)
(2) IET 296 (Industrial Technology Case Problems)

Material Handling Option

(3) IET 268 (Plant Layout)
(3) IET 312 Materials Handling)
(2) IET 296 (Industrial Technology Case Problems)

Quality Control Option

(3) STAT 402 (Elementary Statistics Methods II)
(3) IET 354 (Attribute and Variable Sampling)
(3) IET 364 (Total Quality Control)

Production Option

(3) IET 323 (Production Planning and Expediting)
(3) IET 324 (Production Techniques)
(2) IET 296 (Industrial Tech. Problems)

General Option: As arranged with counselor

MECHANICAL ENGINEERING TECHNOLOGY

This program is intended to prepare specialists in the development of machines and products, in production processes, in the installation and maintenance of machines and in solving repetitive engineering problems.

Mechanical engineering technology is concerned with the generation, transmission, and utilization of mechanical and fluid energy and the design and production of tools and machines and their products.

Graduates of the program accept jobs as laboratory technicians, engineering aides, plant maintenance men, layout men, production assistants, and technical salesmen. With additional experience, promotion to positions such as industrial supervisors, machine and tool designers, technical buyers, production expeditors, and cost estimators are possible.

FRESHMAN YEAR

First Semester

(2) MET 180 (Materials and Processes)
(3) EG 110 (Drafting Fundamentals)
(5) MA 151A (Elementary Mathematics for Engineering and the Physical Sciences)
(3) ENGL 101 (English Composition)
(1) MET 100 (Applied Engineering Computations)
(2) MET 210 (Applied Statics)

(16)

Second Semester

(2) MET 204 (Production of Drawing)
(3) MA 223A (Introductory Analysis I)
(4) MET 211 (Applied Strength of Materials)
(2) MET 335 (Basic Machining)
(3) GNT 220 (Technical Report Writing)
(3) SPE 114 (Fundamentals of Speech Communication)

(17)

SOPHOMORE YEAR

Third Semester

(4) MET 216 (Machine Elements)
(3) MA 224A (Introductory Analysis II)
(3) MET 200 (Power Systems)
(4) PHYS 220 (General Physics)
(3) Technical Elective

(17)

Fourth Semester

(3) MET 330 (Fluid Power)
(3) MET 384 (Instrumentation)
(3) IS 152 (Human Relations in Industry)
(4) PHY 221 (General Physics)
(3) Nontechnical Elective
(3) Technical Elective

(19)

TECHNICAL ELECTIVES

Machine Design Electives

(2) MET 228 (Machine Design)
(3) MET 232 (Dynamics)

HEATING, VENTILATING AND AIR CONDITIONING ELECTIVES

(3) MET 360 (Heating, Ventilating and Air Conditioning)
(3) MET 361 (Refrigeration)

PROCESS PLANNING OPTION

(3) IET 204 (Technique of Maintaining Quality)
(3) IET 224 (Production Planning and Control)

MECHANICAL DRAFTING DESIGN TECHNOLOGY

This program is intended to prepare Senior Draftsmen and Junior Design Draftsmen of a mechanical nature for manufacturing and construction industries, government, utilities, and other service firms. In addition, graduates will be prepared to make industrial illustrations for parts manuals, brochures, proposals, and assembly instructions.

Mechanical Drafting Design Technology concerns matters such as the preparation of sketches and drawings for design proposals, experimental models, prototype configurations, and production parts and assemblies.

Graduates of this program may perform drafting design functions such as the development of the design of a sub-assembly or major component under the direction of an engineer or an engineering technologist.

With additional experience, promotion to checker, designer or drafting supervisor is possible. Also, this program is sufficiently broad to allow for progression into a variety of other technical or supervisory positions.

FRESHMAN YEAR

First Semester

(1) MET 100 (Applied Engineering Computations)
(2) MET 180 (Materials and Processes)
(3) EG 110 (Drafting Fundamentals)
(3) ENGL 101 (English Composition I)
(3) MA 111 (Algebra)
(3) CPT 100 (Computer Utilization)

(15)

Second Semester

(2) MET 256 (Material Fabrication)
(2) MET 204 (Production Drawing)
(3) MET 112 (Applied Mechanisms)
(3) MET 156 (Graphical Computations)
(3) MA 112 (Trigonometry)
(3) SPE 114 (Fundamentals of Speech Communication)

(16)

SOPHOMORE YEAR

Third Semester

(4) MET 212 (Mechanics of Materials)
(3) MET 236 (Jig and Fixture Design)
(3) MET 330 (Introduction to Fluid Power)
(3) EG 317 (Production Illustration)
(4) GNT 136 (Physics: Mechanics and Heat)

(16)

Fourth Semester

(2) MET 288 (Die Design)
(3) MET 299 (Mechanical Engineering Technology)
(3) IET 204 (Techniques of Maintaining Quality)
(4) GNT 176 (Physics: Electricity, Sound and Light)
(3) Elective

(15)

METALLURGICAL ENGINEERING TECHNOLOGY

This program provides two years of collegiate-level training and is designed to prepare students for technological services in metal processing and fabricating industries as well as for technician positions in metallurgical and allied product laboratories. The graduate technician performs a wide range of technology assignments in such areas as: (1) research, design or development; (2) production, operation or quality control; (3) installation, maintenance or sales.

The program is highly adaptable to the needs of business and industry of Northern Indiana. Successful completion will result in the awarding of the degree of Associate in Applied Science. The Associate Degree holder may earn the Bachelor of Science Degree with an additional two years of academic work.

FRESHMAN YEAR

First Semester

(4) CHM 109 (General Chemistry)
(2) MTT 280 (Nonferrous Metallurgy)
(3) ENGL 101 (English Composition I)
(5) MA 151A (Elementary Mathematics for Engineering and the Physical Sciences)
(4) GNT 136 (Physics: Mechanics and Heat)

(18)

Second Semester

(4) CHT 212 (Industrial Chemistry: Qualitative)
(3) MTT 184 (Ferrous Metallurgy)
(3) EG 110 (Drafting Fundamentals)
(3) MA 223A (Introductory Analysis I)
(4) GNT 176 (Physics: Electricity, Sound, and Light)

(17)

SOPHOMORE YEAR

Third Semester

(4) MTT 228 (Physical Metallurgy)
(3) CHT 252 (Industrial Chemistry: Quantitative)
(3) MTT 240 (Heat Transfer and Thermodynamics)
(3) MA 224A (Introductory Analysis II)
(3) SPE 114 (Fundamentals of Speech Communication)

(16)

Fourth Semester

(4) MTT 229 (Physical Metallurgy II)
(3) MTT 284 (Metallography)
(3) MTT 290 (Mechanical Metallurgy)
(3) ECON 210 (Principles of Economics)
(3) GNT 220 (Technical Report Writing)
(3) PSY 370 (Psychology in Business and Industry)

(19)

NURSING (LEADING TO RN)

This program of nursing education provides a means of correlating the philosophy and standards of nursing education with those of general education. The over-all standards and policies of the University apply to the program in nursing as they do to the other educational programs within the University. The associate degree program is designed to fulfill the educational needs of qualified high school graduates who want to (1) prepare for nursing in a relatively short time and (2) study in a multi-purpose collegiate institution where they share the responsibilities, privileges, intellectual and social experiences with all other students. Clinical nursing experiences are obtained in four cooperating area hospitals: St. Catherine—East Chicago, St. Margaret—Hammond, St. Mary Mercy—Gary, and Our Lady of Mercy—Dyer. The University nursing faculty selects, supervises, and evaluates all learning experiences.

Graduates are prepared to give care to patients as beginning general duty nurses, drawing upon their scientific knowledge and understanding of human behavior and needs. They are prepared to develop satisfactory relationships with people, to cooperate and share responsibility for their patients' welfare with other members of the nursing and health staff, and to be self-directive in learning from experience as practicing nurses.

Graduates of the associate degree program in nursing are eligible for state examinations for licensure as registered nurses. This program has been accredited by the National League for Nursing.

FRESHMAN YEAR*

First Semester	Second Semester
(2) BIOL 201 (Biology of Man)	(2) BIOL 203 (Biology of Man)
(1) BIOL 202 (Laboratory in Human Biology)	(1) BIOL 204 (Laboratory in Human Biology)
(3) CHM 119 (General Chemistry)	(3) BIOL 220 (Introduction to Microbiology)
(3) PSY 120 (Elementary Psychology)	(3) PSY 235 (Child Psychology) or CDFL 210 (Child Development)
(3) F&N 303 (Essentials of Nutrition)	(3) PCOL 201 (Pharmacology)
(5) NT 110 (Introduction to Nursing)	(5) NT 120 (Maternal and Child Nursing)
(17)	(17)

SOPHOMORE YEAR

Third Semester	Fourth Semester
(3) SOC 100 (Introductory Sociology)	(3) NT 250 (Seminar in Nursing)
(3) ENGL 101 (English Composition I)	(7) NT 215 (Medical and Surgical Nursing II)
(7) NT 214 (Medical and Surgical Nursing I)	(4) NT 231 (Psychodynamic and Psychiatric Nursing II)
(4) NT 230 (Psychodynamic and Psychiatric Nursing I)	(3) Elective
(17)	(17)

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* All nursing courses must be taken in sequence.

B.S. DEGREE IN INDUSTRIAL EDUCATION

The Department of Industrial Education is a part of the School of Technology and offers four-year programs leading to the degree of Bachelor of Science in Industrial Education. Calumet students may be identified with this department although the complete four-year program is now available only at the Lafayette Campus.

The core requirements for all students in industrial education are listed below. Details of the programs and courses required beyond the core subjects may be found in the School of Technology Bulletin.

Core Requirements for B.S.I.Ed.

(1) IED 110 (Introduction to Industrial Education)
(3) ED 285 (Educational Psychology)
(6) ED 464 (Supervised Teaching)
(6) ENGL 101 and 102 (English Composition I and II)
(3) SPE 114 (Fundamentals of Speech Communication)
(3) PSY 120 (Elementary Psychology)
(3) PHIL 110 (Introduction to Philosophy)
(3) HIST 252 (The United States and Its Place in World Affairs)
(3) POL 101 (Introduction to Government)
(3) ECON 210 (Principles of Economics)
(3) SOC 100 (Introductory Sociology)
(6) MA 153 and 154 (Algebra and Trigonometry I and II)
(6) CHM 113 and 114 (Introductory Chemistry)
(8) PHYS 220 and 221 (General Physics)
(2) ED 304 (Principles of Teaching)
(3) ED 502 (American School System)

B.S. DEGREE FOR TECHNICIANS

The Bachelor of Science degree awarded under the School of Technology's "2+2" education plan is unique. A student following this plan earns first an Associate degree in two years and a Bachelor of Science degree in two more years.

A student is awarded an Associate in Applied Science degree upon successful completion of the two year technician program. The Associate degree signifies that the recipient is educated at the technician's level and is "job-ready." Thus, individuals may go directly into well-paying job in industry or they may elect to continue study.

A student who desires to continue his formal education may be admitted to a two year "add-on" technologist's program. A student who successfully completes this program is awarded a Bachelor of Science degree. This provides the background for increased job responsibility. Four options are available to qualified students.

Options

Construction—for graduates of Architectural Technology or Civil Engineering Technology Associate Degrees programs. (see page 125)

Electrical—for graduates of the Electrical Engineering Technology Associate Degree program. (see page 126)

Mechanical—for graduates of Mechanical Engineering Technology Associate Degree programs. (see page 127)

Supervision Technology—for graduates of any associate degree program desiring to follow a more general course of study. (see below)

Admission Requirements

Applicants for admissions to any of these options must have earned an Associate degree in one of the technologies. Transfer students will be admitted to Purdue University according to standard procedures.

Graduation Requirements

The technician who pursues a B.S. degree will follow a plan of study which includes minimum 67 semester credit hours beyond the Associate degree. Students transferring from other institutions must complete at least 32 semester credit hours of course work in residence in the third and fourth year of the B.S. degree program.

B.S. DEGREE IN SUPERVISION TECHNOLOGY

The Supervision Technology Option is administered by the Department of Industrial Supervision and is offered at the Calumet Campus, the Fort Wayne Campus, and the Indianapolis Campus.

The Supervision Technology Option utilizes the technical proficiency for the associate degree and helps prepare the student for a career in the supervision of a technical group. Applicants for admission to the Supervision Technology Option must have earned an AAS degree in one of the technologies or a comparable degree or diploma. A minimum of 67 hours is required, beyond the AAS degree.

The following courses are required in the Supervision Technology Option:

ECON 210	Introduction to Economics
EET 216	Electrical Machines & Controls
ENGL 185	Developmental Reading
ENGL 421	Business Writing, Engr. Applic.
IET 110	Electronic Data Processing
INDM 200	Introduction to Accounting
INDM 201	Cost Accounting
IS 368	Legislation Affecting Ind. Rel.
IS 374	Industrial Supervision
MA 223A	Introductory Analysis I
MA 224A	Introductory Analysis II
MET 180	Materials and Processes
MET 200	Power Systems
MET 212	Mechanics of Materials
SPE 315	Speech Communication of Technical Information
SPE 415	Discussion of Technical Problems

In consultation with his advisor from the Department of Industrial Supervision, the student in the Supervision Technology Option may select courses within the following fields of study: chemistry, civil engineering technology, computer science, computer technology, economics, electrical engineering technology, engineering graphics, industrial engineering technology, industrial management, industrial supervision, mathematics, mechanical engineering technology, physics, statistics, and courses within the School of Humanities, Social Science, and Education.

B.S. DEGREE IN CONSTRUCTION TECHNOLOGY

This baccalaureate program is open to students with an associate degree in architectural technology, civil engineering technology, or the equivalent. It is an extension of the associate degree program with emphasis on: the principles and practices of construction, further development of the technical courses of the associate degree program, an introduction to the principles of business and management, and additional training in written and verbal communications.

Graduates of the program find employment with contractors, architects, consulting engineers, building product companies, or governmental organizations. Experienced graduates may be employed in a wide variety of occupational areas such as: contracting, detailing, drafting, estimating, inspecting, merchandising, supervising, and testing. This curriculum is not designed to prepare students for registration as professional architects or engineers.

JUNIOR YEAR

Fifth Semester

(3) ART 322 (Architectural Drafting)
or
CET 309 (Subdivision Planning)
(3) CPT 200 (Computer Programming Fundamentals)
(3) IET 250 (Fundamentals of Production Cost Analysis)
(3) Nontechnical Elective
(3) Technical Elective
(2) Elective

(17)

Sixth Semester

(3) CET 344 (Construction Inspection)
(2) CPT 345 (Computer Graphics)
(3) IS 374 (Industrial Supervision)
(3) Nontechnical Elective
(3) Technical Elective
(3) Elective

(17)

Summer Semester

(1) ART 390 (Construction Field Problem)

SENIOR YEAR

Seventh Semester

(3) CET 441 (Construction Methods)
(4) IS 368 (Legislation Affecting Industrial Relations)
(3) ENGL 421 (Business Writing: Engineering Applications)
(3) SPE 315 (Speech Communication of Technological Information)
(3) Technical Elective
(2) Elective
(18)

Eighth Semester

(3) ART 476 (Specifications)
(3) INDM 583 (Small Business Management)
(3) SPE 415 (Discussion of Technical Problems)
(3) Technical Elective
(3) Elective
(15)

TECHNICAL ELECTIVES

For ART Graduates: ART 360, 362, 490 (6 hours)
For CET Graduates: ART 364, CET 386, 431, 442.

B.S. DEGREE IN ELECTRICAL TECHNOLOGY

The student who completes the plan of study and receives the degree of Associate in Applied Science is eligible to enter the following Bachelor of Science program. This B.S. degree program prepares the student for positions as technologists in manufacturing industries. The plan provides additional study in Electrical Engineering Technology and courses that provide the background of related technical and nontechnical topics which are essential in modern industry.

JUNIOR YEAR

Fifth Semester

(3) EET 321 (Generation and Distribution of Electrical Power)
(4) MET 212 (Mechanics and Materials)
(3) STAT 401 (Elementary Statistical Methods I)
(4) CHM 115 (General Chemistry)
(1) ENGL 185 (Developmental Reading)
(3) Nontechnical Elective
(18)

Sixth Semester

(3) EET 383 (Advanced Electrical Networks)
(3) MET 200 (Power Systems)
(4) IET 224 (Production Planning and Control)
(3) CPT 200 (Computer Programming Fundamentals)
(3) ENGL 421 (Business Writing, Engineering Applications)
(16)

SENIOR YEAR

Seventh Semester

(3) EET 362 (Automatic Control Systems)
(4) MET 216 (Machine Elements)
(3) MET 300 (Applied Thermodynamics)
or
MET 335 (Basic Machining)
(3) ECON 210 (Principles of Economics)
(3) SPE 315 (Speech Communication of Technical Information)
(2) ENGL 590 (Directed Writing)

(18)

Eighth Semester

(3) EET 499 (Electrical Engineering Technology)
(3) EET Elective
(3) IS 374 (Industrial Supervision)
(3) IET 250 (Fundamentals of Production Cost Analysis)
(3) SPE 415 (Discussion of Technical Problems)
(3) Nontechnical Elective

(18)

BACHELOR OF SCIENCE DEGREE MECHANICAL TECHNOLOGY

Graduates of the two year mechanical engineering technology program are eligible for admission to this two year "add-on" curriculum.

This baccalaureate program prepares graduates to fill technical positions in manufacturing and production industries such as production supervisor, plant engineer, and tool engineer technologist.

With a detailed knowledge of the relevant practices, procedures, and codes established by engineers, technologists thus will become a key employee in transforming from concept to reality a device or system conceived in the mind of and designed by the engineer.

The plan of study provides for the broadening of the associate degree graduate in communications, interpersonal relations, supervision techniques, and associated technical areas.

JUNIOR YEAR

Fifth Semester

(3) CPT 100 (Computer Utilization)
(3) EET 101 (Electrical Circuits I)
(2) EET 103 (Electronics I: Vacuum Tubes and Transistors)
(2) EET 113 (E.E.T. Laboratory I)
(1) ENGL 185 (Developmental Reading)
(3) IET 250 (Production Cost Analysis)
(3) MET 300 (Applied Thermodynamics)

(17)

Sixth Semester

(3) EET 151 (Electrical Circuits II)
(3) EET 153 (Electronics II)
(2) EET 163 (E.E.T. Laboratory II)
(3) MET 350 (Applied Fluid Mechanics)
(3) SOC 312 (American Society)
(3) STAT 401 (Elementary Statistical Methods)

(17)

SENIOR YEAR

Seventh Semester

(3) CPT 200 (Computer Programming Fundamentals)
(3) ECON 210 (Principles of Economics)
(3) ENGL 421 (Business Writing: Engineering Applications)
(3) MET 355 (Production Machining)
(3) MET 384 (Instrumentation)
(3) SPE 315 (Speech Communication of Technological Information)

(18)

Eighth Semester

(2) ENGL 590 (Directed Writing)
(3) IS 374 (Industrial Supervision)
(3) PHIL 150 (Principles of Logic)
(3) MET 426 (Internal Combustion Engines)
(3) MET 497 (Project)
(3) SPE 415 (Discussion of Technical Problems)

(17)

CERTIFICATE PROGRAMS

Professional Foremanship

The professional foremanship certificate program is an intensive and practical curriculum equivalent to 36 semester hours. It is intended to provide foremen with the professional education needed to handle the many supervisory and technical problems which they meet daily in technical, communications, and human relations fields.

The program has been set up by representatives of industry, professional foremen's organizations, and the Department of Industrial Supervision. It is designed to meet the needs of management, which is vitally concerned with training foremen for positions of leadership. Enrollment is on the basis of a program worked out with the counselor assigned and carefully tailored to individual needs.

Students admitted in the temporary classification may qualify for the certificate in professional foremanship by taking approved undergraduate level, lower-division technology courses for which their admission classification establishes eligibility and for which they have necessary prerequisites. Appropriate credits earned in this program while in the temporary student classification may be used for credit toward an associate degree under rules governing reclassification as a regular student.

REQUIRED COURSES

(3) IET 104 (Industrial Organization and Production)
(3) PSY 120 (Elementary Psychology)
(3) IS 152 (Human Relations in Industry)
(3) SPE 114 (Fundamentals of Speech Communication)

OPTIONAL COURSES

Group I—14 semester hours maximum

Communications	10 hours maximum
English and report writing	7 hours maximum
Advanced courses in speech	3 hours maximum

Economics and labor relations	6 hours maximum
Physical sciences	12 hours maximum

Group II—8 semester hours maximum:

Courses specific to two-year certificate curricula—8 semester hours maximum

Courses from one or more technologies may be elected in this group provided that (1) they relate directly to the individual's duties, responsibilities, or line of promotability; and (2) prior approval of the counselor and the head of the department administering the program is obtained.

Management Experience

(Equivalent to 12 semester hours)

Before receiving the Professional Foremanship Certificate, the candidate must have had two years of successful experience in the management field. Satisfaction of this requirement is met by a confirming letter from the managerial employer under whom the candidate worked. Formal credit is not established for this work, but it is treated as equivalent to 12 semester hours of credit in the professional foremanship program.

Practical Nursing

The program of practical nursing is administered through the Department of Nursing. Its purpose is to prepare students:

1. To serve as a member of a nursing team under the supervision of the registered nurse or physician in giving direct nursing care to infants, children, and adults who need skilled but uncomplicated care.
2. To assist the registered nurse in giving complex nursing care to patients in all age groups who are acutely ill. Here she contributes a part of the nursing care; the major responsibility is carried by the professional nurse.

The program is accredited by the Indiana State Board of Nurses' Registration and Nursing Education and is one year in length. The preclinical curriculum provides classroom and laboratory instruction in the basic principles of nursing care with primary emphasis on developing skills and techniques in giving safe and comforting care to patients.

The clinical curriculum provides classroom and clinical instruction in five specialized, 8 week courses, in four affiliating hospitals. These courses are in medical and surgical nursing, maternity and care of the newborn, pediatrics and long term illness.

Purdue University awards a certificate upon satisfactory completion of the program, and these nurses are eligible candidates for state board practical nurse licensure by examination.

Certificate Units	Course Number and Title	Fee
	First Semester	
(6)	NT 8 (Vocational Ethics and Personal Hygiene)	$38
(7)	NT 16 (Family Living)	$74
(10)	NT 24 (Nursing Care)	$63

Second and Third Semesters

(11)	NT 44 (Medical Clinical Experience)	$10
(11)	NT 56 (Surgical Clinical Experience)	$10
(11)	NT 64 (Maternity Clinical Experience)	$10
(11)	NT 72 (Pediatrics and Long-term Illness Clinical Experience)	$10

Practical Industrial Electronics

Many industrial maintenance people now working in the fields of instrumentation and electricity have not had the opportunity to gain, through either formal education or experience, the knowledge needed in this new technology dealing with electronics. Purdue University Calumet Regional Campus offers a two-year certificate program in electronics to assist in this demand. The goal of the course is to present the material in such a fashion that electricians, instrument men, and engineers will obtain a basic background and working knowledge of the electronic techniques necessary to install, maintain, and trouble-shoot measuring systems, communication systems, and control systems.

As this is a noncredit practical program, admission will be granted to those individuals who can profit by the training offered. The University reserves the right to limit the enrollment in these courses. The two-year program is described below.

Certificate Units	Course Number and Title
	First Semester
(4)	EET 15 (Basic Electricity)
	Second Semester
(4)	EET 23 (Transistor and Vacuum Tube Fundamentals)
	Third Semester
(4)	EET 39 (Electronic Circuits)
	Fourth Semester
(4)	EET 41 (Electronic Control Circuits)
	or
(4)	EET 45 (Communications Electronics)

Practical Industrial Instrumentation

Modern industrial techniques assign an increasing portion of the burden of monitoring and control to instruments. For maximum performance, instruments must be well-constructed, properly applied, and carefully maintained. Qualified personnel specially trained in the theory and application of electrical circuits as applied to the design and use of instruments and instrumentation systems at every stage of the industrial process are in short supply. With the guidance of the Calumet Area Committee on Industrial Training, Purdue University's Department of Electrical Engineering Technology has developed a program of practical study in basic physical measurements, electricity, nonelectronic, and electronic instruments to fill this critical need.

In three semesters, someone new to the instrumentation field will become familiar with the basic principles and practices employed in a wide variety of industrial operations. Beginners wishing to undertake the study of instruments and their principles may take a sequence of courses providing general background in physical measurement and electricity as well as a course providing a basic understanding of instruments and controllers which may be pneumatic, mechanical, and even electrical in their operational principles, but do not incorporate electronic elements or circuitry in their design.

Those students with experience or with more extensive technical backgrounds may find it to their advantage to prepare a sound basis for advanced study by enrolling in the Electronics Institute prior to attempting the study of the formulation and operation of electronic and electrical instrumentation systems and controllers.

Hardware from a variety of manufacturers and associated test equipment used in the classroom will be of high quality modern designs admirably adapted to acquaint students with test methods used in checking, installing, controlling, and maintaining instrumentation systems.

As this is a noncredit practical program, admission will be granted to those individuals who can profit by the training offered. The university reserves the right to limit the enrollment in these courses. The two-year program is described below.

Certificate Units	Course Number and Title
	FIRST YEAR
	First Semester
(4)	EET 15 (Basic Electricity)
	Second Semester
(4)	MET 15 (Fundamentals of Physical Measurement)
	SECOND YEAR
	Third Semester
(4)	MET 21 (Nonelectronic Instruments and Systems)
	Fourth Semester
(4)	EET 23 (Transistor and Vacuum Tube Fundamentals)
	THIRD YEAR
	Fifth Semester
(4)	EET 39 (Electronic Circuits)
	Sixth Semester
(4)	EET 41 (Electronic Control Circuits)
	FOURTH YEAR
	Seventh Semester
(4)	EET 51 (Electronic Instrumentation and Systems)

ARCHITECTURAL TECHNOLOGY

Professor Moss in charge, Lafayette

Professor Hutton, chairman, Calumet Section

116. ARCHITECTURAL DRAWING. Lab. 6, cr. 2.

Introduction to architectural drawing, including use of instruments, lettering, orthographic projection, isometric views, and simple working drawings.

118. ARCHITECTURAL PROJECTIONS. Lab. 6, cr. 2.

Introduction to projection, intersections, shading and shadows, and perspective drawing.

120. FREEHAND DRAWING I. Class 0, Lab. 6, cr. 2.

Freehand sketching using pencil, charcoal, ink.

121. FREEHAND DRAWING II. Class 0, Lab. 6, cr. 2.

Continuation of ARET 120; use of color.

150. ARCHITECTURAL CONSTRUCTION I. Lab. 9, cr. 3. Prerequisite: ARET 116 or 118.

Problems in wood frame structures, such as houses, details, and elementary design.

164. BUILDING MATERIALS. Class 2, cr. 2.

Properties and use of materials as found in building construction.

172. SYSTEMS OF CONSTRUCTION. Class 2, cr. 2.

Survey of different types of construction, including wood, steel, and reinforced concrete and curtain walls, considering the characteristics, advantages, and limitations.

204. BUILDING REGULATIONS. Class 2, cr. 2.

Building codes, ordinances, and regulations, with emphasis on those for structures in Indiana.

210. HISTORY OF ARCHITECTURE I. Class 3, cr. 3.

Survey of styles and influences of cultures which led to the development of architecture from the earliest times to the present day.

222. ARCHITECTURAL CONSTRUCTION II. Lab. 9, cr. 3. Prerequisite: ART 150.

Projects in moderate-sized buildings using various building materials. Transmission of this knowledge in the form of construction drawings.

224. ARCHITECTURAL CONSTRUCTION III. Class 0, Lab. 6, cr. 3 or class 0, Lab. 9, cr. 4. Prerequisite: ART 222.

Continuation of ART 222.

276. SPECIFICATIONS AND CONTRACT DOCUMENTS. Class 2, cr. 2. Prerequisites: ART 156 and 220; prerequisite or corequisite: ENGL 421.

Preparation of general conditions and major phases of building construction specifications, study agreements, contracts, liens, and bonds.

278. BUILDING CONSTRUCTION PRACTICES. Class 2, cr. 2. Prerequisite or corequisite: IS 268 and ART 276.

Extensive survey of business practices and problems common to the construction industry.

280. QUANTITY SURVEY. Class 2, Lab. 3, cr. 3. Prerequisites: ART 156 and ART 164.

Approximate and detailed methods of estimating materials and labor required to erect a building.

284. MECHANICAL EQUIPMENT OF BUILDINGS. Class 3, cr. 3.

Survey course of the different types of systems and their applications.

292. ESTIMATING. Class 3, cr. 3. Prerequisites: ART 156, 164, and 220.

Approximate and detailed methods of estimating materials and labor required to erect a building.

299. ARCHITECTURAL ENGINEERING TECHNOLOGY. cr. 1-4.

Hours and subject matter to be arranged with staff.

310. HISTORY OF ARCHITECTURE II. Class 3, cr. 3. Prerequisite: ART 210.

A survey of architectural developments of the nineteenth and twentieth centuries.

322. ARCHITECTURAL DRAFTING. Lab. 9, cr. 3. Prerequisite: EG 110. Not open to students with credit in ART 222.

The drawing of architectural plans for moderate sized buildings using various building materials. Plans include floor plans, elevations, and detail sections. Attention is given to the quality of the drawings as well as the technical details of construction.

360. COMMUNITY PLANNING I. Class 2, Lab. 3, cr. 3.

Analysis, procedure and application of planning problems.

362. **COMMUNITY PLANNING II.** Class 1, Lab. 6, cr. 3.

Continuation of Community Planning I, application of planning to specific problems.

364. **MATERIALS OF CONSTRUCTION.** Class 2, cr. 2. Not open to students with credit in ART 164.

Fundamental aspects of the important materials of modern construction and how these materials can be used to best advantage.

390. **CONSTRUCTION FIELD PROBLEMS.** cr. 1.

Credit to be established by assignment to special field problems, such as a local construction project, with the aim of giving the student first hand experience in supervision practice.

476. **SPECIFICATIONS.** Class 3, cr. 3.

Expansion of the general principles of construction documents covered in ART 276. Detailed study of purpose and intent of specifications. Preparation of various sections of specifications for specific jobs, including: Development of the general conditions, adaptation of selected provisions for standard specifications, and delineation of special supplemental conditions.

490. **CONSTRUCTION SEMINAR.** Class 1, Lab. 9, cr. 4.

Final project aimed at combining the skills and knowledge gained from the various areas of studies. The student will be expected to report graphically, orally and in written form on a final project approved by the advisor. Presentation will be made to a representative board of the faculty determined by the advisor.

499. **ARCHITECTURAL TECHNOLOGY.** Cr. 1-4.

Hours, subject matter and credit to be arranged with staff. Course may be repeated for credit up to 9 hours.

CHEMICAL TEHNOLOGY

Professor Thomas in charge, Lafayette

109. **GENERAL CHEMISTRY.** Class 3, Lab. 3, cr. 4.

A one semester general chemistry course intended for technology students.

CHT 201. **UNIT OPERATIONS I.** Class 3, cr. 3. Prerequisite: MA 151.

This course will acquaint the student with chemical process equipment, its use, and its applications. It focuses study on the principles, materials, systems of equipment, and some of the problems involved in chemical manufacturing processing. Chemical plant operations such as filtration, evaporation, drying, crystallization, solvent extraction, and distillation and fluid handling are described and discussed.

202. **UNIT OPERATIONS II.** Class 3, cr. 3. Prerequisite: CHT 201.

A continuation of Unit Operations I.

212. **INDUSTRIAL CHEMISTRY: QUALITATIVE.** Class 2, Lab. 6, cr. 4. Prerequisite: CHM 109 and MA 151A (or equivalent).

Systematic semimicro analysis, with emphasis upon modern industrial techniques.

225. **QUANTITATIVE ANALYSIS, INSTRUMENTAL.** Class 3, Lab. 3, cr. 4. Prerequisite: CHM 224.

A continuation of the study of the chemical methods applied in quantitative analysis. Emphasis in this course is on oxidation-reduction reactions, precipitation titrimetry, and the analysis of multicomponent materials. The use of instrumental methods for performing analyses is introduced after the traditional methods have been covered. Emphasis will be upon application, limitations, and common errors in the methods, rather than upon the design, operation, and servicing of specific instruments.

251. **ORGANIC CHEMISTRY.** Class 4, Lab. 3, cr. 5.

A one semester organic chemistry course intended for technology students.

252. **INDUSTRIAL CHEMISTRY: QUANTITATIVE.** Class 2, Lab. 6, Cr. 4. Prerequisite: CHT 212.

An introduction to gravimetric, titrimetric, and potentiometric methods applicable to modern industrial practices.

273. **PHYSICAL CHEMISTRY OF MATERIALS.** Class 3, cr. 3.

An introductory treatment of the general properties of gases, liquids, and solids and the factors influencing them under extremes of temperature and pressure. This course is specifically designed for technology students.

CIVIL ENGINEERING TECHNOLOGY

Professor Moss in charge, Lafayette

Professor Hutton, chairman, Calumet Section

UNDERGRADUATE LEVEL

Lower-Division Courses

104. **ELEMENTARY SURVEYING.** Class 2, Lab. 3, cr. 3. Prerequiste or corequisite: MA 112, MA 151A or equivalent.

Measurement of distances, directions and angles, using the tape, level, compass and transit. Computation of areas and traverses, lines and grades.

160. **STATICS.** Class 3, cr. 3. Prerequisite: GNT 136.

Study of force action on bodies at rest. Coplanar and non-coplanar forces, concurrent and non-concurrent forces, friction forces, hydrostatic forces, controids and moments of inertia, will be studied. An introduction to dynamic forces will be included.

208. **ROUTE SURVEYING.** Class 1, Lab. 3, cr. 2. Prerequisite: CET 104.

Preliminary and construction surveys for highways and railroads, including simple, compound, reverse, and easement curves, super-elevation of curves, profiles, grade lines, slope stakes, yardage estimates, and mass and haul diagrams.

209. **LAND SURVEYING AND SUBDIVISION.** Class 1, Lab. 6, cr. 3. Prerequisite: CET 104.

Theory and practice of land surveying, subdivision, filing and recording deeds, United States government survey of public lands, laws of land surveying, descriptions and area computations for land surveys. Subdivision planning, caluculations and plotting, water main layouts, storm and sanitary sewer calculations and layouts. Street plans and profiles.

253. **HYDRAULICS AND DRAINAGE.** Class 3, cr. 3. Prerequisite: GNT 136.

Basic fluid statics, Bernoulli's equation, flow of fluids in water lines and sewer lines, overland and ditch drainage and culvert size determination.

260. **STRENGTH OF MATERIALS.** Class 3, cr. 3. Prerequisite: CET 160.

Study of stress-strain relationships, shear and bending moment diagrams, stresses and deflections of beams, axial loads, and combined stresses. Applied problems in the field of structural design.

266. **MATERIALS TESTING.** Class 1, Lab. 6, cr. 3. Prerequisite or corequisite: CET 260 or MET 212.

Testing of construction materials to determine physical and mechanical properties. Preparation of reports from data secured from such tests.

280. **STRUCTURES I.** Class 1, Lab. 6, cr. 3. Prerequisite or corequisite: MET 212 or CET 260.

Graphic analysis of trusses and beams, including stress diagrams, graphical shear and bending moment diagrams, and sizing of structural members.

281. **STRUCTURES II.** Class 3, cr. 3. Prequisites: CET 260 or MET 212.

Design of wood and steel frame structures including shear and bending moment diagrams, influence lines, sizing beams, columns and connections, computation of deflections and combined stresses and approximate methods.

309. **SUBDIVISION PLANNING.** Class 1, Lab. 6. cr. 3. Prerequisite: CET 104. Not open to students with credit in CET 209.

Subdivision planning, calculations and plotting; street plans and profiles; and sewer layouts. Theory and practice of land surveying, laws of land surveying, filing and recording of deeds, and area computations for land surveys.

366. **MATERIALS TESTING II.** Class 1, Lab. 6, cr. 3. Prerequisite: CET 266.

An introduction to testing structural elements and complete structures. Strain gauge measurements, instrumentation, and the design of tests to eliminate variables. Statistical analysis of test data.

386. **REINFORCED CONCRETE.** Class 4, cr. 4. Prerequisites: MET 212 or CET 260.

Study of the properties of reinforced concrete and its ability to carry stresses. Fundamentals of reinforced concrete design as applied to beams, slabs, columns, walls and footings.

431. **APPLIED SOIL MECHANICS.** Class 2, Lab. 3, cr. 3. Prerequisites: CET 260 or MET 212.

Fundamentals of soil mechanics with emphasis on laboratory and field testing for application to problems in foundation design, highway subgrade compaction, and drainage.

441. **CONSTRUCTION METHODS.** Class 3, cr. 3. Prerequisite: junior or senior standing.

Construction methods and equipment used in building construction, earthwork, bridges, and roads. Topics include: excavation, formwork, concreting, steel erection, masonry, scheduling, job management, and safety.

442. CONSTRUCTION COSTS AND BIDDING. Class 2, Lab. 3, cr. 3. Prerequisites: CET 441 and IET 250.

Estimating total job costs, and the bidding practices of the construction industry. Topics include: unit costs of materials and labor, quantity survey, overhead, sub-contracts, total estimated cost, and bid price. The laboratory period is for the development of costs for an actual job.

COMPUTER TECHNOLOGY

Professor Moss in charge, Lafayette

Professor Maniotes, Chairman, Calumet Section

UNDERGRADUATE LEVEL

Lower-Division Courses

100. COMPUTER UTILIZATION. Class 2, Lab. 3, cr. 3.

An introduction to data processing techniques through the use of unit record and high-speed computer equipment. Emphasis will be on how computers can assist the technologist. Theory will be reinforced by laboratory demonstration. One laboratory hour will be scheduled; two laboratory hours will be arranged.

101. INTRODUCTION TO COMPUTERS. Class 3, cr. 3.

An introduction to computers and data processing. The historical development of unit record equipment and electronic digital computers; a brief introduction to machine language, assembly language, FORTRAN, and COBOL programming; and a survey of computer applications.

111. UNIT RECORD DATA PROCESSING. Class 2, Lab. 2, cr. 3.

This course illustrates the concept, power, and flexibility of the unit record and the need for machines in accounting and record keeping. The importance and the scope of unit record equipment as an independent system will be developed throughout the course. Laboratory exercises will involve the card punch, verifier, sorter, interpreter, reproducing punch, collator, accounting machine and calculator. Practical exercises offered will involve planning and wiring a range of unit record equipment and will be typical of those performed in the existing electronic accounting machine installations.

122. COMPUTER MATHEMATICS. Class 3, Cr. 3. Prerequisite or corequisite: MA 151A or MA 153.

Selected topics in mathematics that are related to business and computer computations. Topics include: symbolic logic; binary, octal, and hexadecimal number systems; determinates; matricies; and linear systems.

131. ASSEMBLY LANGUAGE PROGRAMMING I. Class 2, Lab. 2, cr. 3. Pre-

Programming of a digital computer at the machine language and assembly language levels with emphasis on the meticulous step by step development of a program. Topics include: Computer hardware, stored program concepts, operation codes, addresses, flow diagrams and assembly language translators. In the laboratory, students write, process, and debug programs using the computer on an open shop basis.

132. ASSEMBLY LANGUAGE PROGRAMMING II. Class 2, Lab. 2, cr. 3. Prerequisite: CPT 131.

Advanced symbolic programming techniques. Programming exercises and case studies are designed to familiarize the student with actual programming practices and to bridge the gap from the theoretical to the real world of data processing.

198. DATA PROCESSING PRACTICE I. cr. 1.

Practice in industry with written reports of this practice for co-op students.

200. COMPUTER PROGRAMMING FUNDAMENTALS. Class 2, Lab. 2, cr. 3.

The presentation of the basic elements of programming digital computers. There is a treatment of absolute and symbolic coding, magnetic tape functions, and random access processing. Major emphasis will be on compiler language (FORTRAN) programming.

220. NUMERICAL ANALYSIS I. Class 2, Lab. 2, cr. 3. Prerequisite: CPT 264.

This course provides the knowledge of numerical methods necessary for finding solutions to mathematical equations and for analysis of tabulated data. It is a laboratory course consisting chiefly of the solution to specific problems by computer programming and other methods. Topics include finite difference calculus, finite difference equations, differentation, and integration techniques, error analysis, and iterative methods for solving linear equations.

221. **NUMERICAL ANALYSIS II.** Class 2, Lab. 2, cr. 3. Prerequisite: CPT 220.

This is a continuation of Numerical Analysis I. Topics include linear equations and matrices, direct and iterative methods, eigenvalues and eigenvectors of matrices.

225. **STATISTICAL METHODS.** Class 3, cr. 3. Prerequisite or corequisite: CPT 264.

An introduction to elementary statistics with emphasis on the analysis of actual data. Topics include: description and representation of sample data, probability, theoretical distribution, sampling, estimating, correlation, regression, and computer statistical routines.

254. **COMMERCIAL SYSTEMS APPLICATIONS.** Class 2, Lab. 2, cr. 3. Prerequisite or corequisite: INDM 200. Prerequisites: CPT 131, IET 104.

In introduction to the problems of developing integrated data processing systems for more efficient handling of the data flow in modern business. The student will produce reports needed by management, prepare flowcharts, design forms, and write procedures for designated systems.

264. **COMPILER LANGUAGE PROGRAMMING I.** Class 2, Lab. 2, cr. 3. Prerequisite: CPT 131. Prerequisite or corequisite: CPT 122.

The structure and details of FORTRAN, a mathematically oriented compiler language. Numerous problems are solved on the computer to demonstrate the many facets of the language.

265. **COMPILER LANGUAGE PROGRAMMING II.** Class 2, Lab. 2, cr. 3. Prerequisite: CPT 131.

A study of two programming languages, COBOL and Report Program Generator, which are oriented toward data handling and processing tasks. The student will study the structure and details of these languages and perform programming exercises as well as consider practical applications.

272. **COMPUTER APPLICATIONS IN OPERATIONS RESEARCH.** Class 3, Lab. 2, cr. 4. Prerequisites: CPT 122 or CPT 220 and CPT 264.

An introduction to the mathematical models of operations research, such as linear and dynamic programming, that are used in management sciences. Topics include: inventory control, production planning and control finance, purchasing, accounting, forecasting, engineering, and science.

284. **UTILITY PROGRAMS.** Class 2, Lab. 2, cr. 3. Prerequisite: CPT 132 and CPT 264.

This course is designed to familiarize the student with existing programs normally found in operating data processing centers. These include sort/merge routines, supervisory routines, report generators, random access utility programs, magnetic tape routines, etc.

286. **COMPUTER OPERATING SYSTEMS I.** Class 2, Lab. 2, cr. 3. Prerequisite: CPT 132.

An introduction to the operating system of a computer. Topics include: job control monitor, program supervisor, language compilers, and utility programs.

290. **COMPUTER PROJECT.** Cr. 1-4.

Independent study for sophomore students who desire to execute a complete computer-oriented project. Course may be repeated for credit up to 6 hours.

294. **COMPUTER SEMINAR AND FIELD TRIPS.** Cr. 1.

A survey of a wide variety of computers currently in use. Lectures cover the latest innovations in computer hardware. Field trips are taken to inspect various types of computer installations.

298. **DATA PROCESSING PRACTICE II.** cr. 1.

Practice in industry. Written reports of this practice for co-op students.

299. **COMPUTER TECHNOLOGY.** Class 0-9, Lab. 0-9, cr. 1-4.

Hours, credit and subject matter to be arranged by staff. May be repeated for credit up to 9 hours.

300. **INTRODUCTION TO COMPUTERS.** Class 3, cr. 3.

A broad survey of computers, data processing, and applications. Punched card preparation, unit record equipment, computer hardware, and programming principles and languages. Applications emphasize how the computer is used as a tool to assist the user.

340. **DATA COMMUNICATIONS.** Class 2, Lab. 2, cr. 3. Prerequisite: CPT 132.

The role of data communications in modern computation. Real time systems and data transmission. Topics include:

terminal equipment, communication media, data codes, error detection and correction, and terminal softwave.

345. **COMPUTER GRAPHICS.** Class 2, cr. 2. Prerequisite: An introductory computer course.

A survey of computer hardware used to make graphic displays including printer, plotter, and cathode ray tube. Programming techniques for plotting lines and special symbols, the organization and representation of data, and a survey of applications.

360. **COMPILER LANGUAGE PROGRAMMING III.** Class 3, cr. 3. Prerequisite: CPT 264 or CPT 265.

The detailed structure of several compiler languages and their applications. Languages include: PL/1, ALGOL, and others.

386. **COMPUTER OPERATING SYSTEMS II.** Class 2, Lab. 2, cr. 3. Prerequisite: CPT 286.

A continuation of CPT 286 with emphasis on systems generation, control languages, and time-sharing.

396. **COMPUTER LABORATORY.** Lab. 1-6, cr. 1-2.

Applied computer laboratory experiences carried out on an independent study basis in conjunction, with other courses, assignments, or problems.

ELECTRICAL ENGINEERING TECHNOLOGY

Professor Rainey in charge, Lafayette

Professor Brunner, Chairman, Calumet Section

PERSONAL SERVICE COURSES

15. **BASIC ELECTRICITY.** Class 2, Lab. 4.

Basic electrical terms, units, symbols, and schematics are discussed. Equipment such as voltmeters, ohmmeters, ammeters, generators, and oscilloscopes are demonstrated. Magnetism, inductance, capacitance series and parallel circuits are considered. Basic principles of alternating current, capacitance reactance, inductive reactance, impedance, phasors, power factor, and resonance are studied.

23. **TRANSISTOR AND VACUUM TUBE FUNDAMENTALS.** Class 2, Lab. 4.

Transistor fundamentals, semiconductor diodes, vacuum tube diodes, triodes, tetrodes, pentodes are discussed. The use of oscilloscopes, audio oscillators, and voltmeters in electronic circuits such as amplifiers, power supplies, and oscillators is considered.

39. **ELECTRONIC CIRCUITS.** Class 2, Lab. 4.

Transistors and vacuum tubes used in circuits are considered. Power supply circuits, audio amplifiers, RF amplifiers, oscillators, modulation, AM transmitters and receivers, FM transmitters and receivers are discussed. Special electronic circuits such as clippers, clampers, multivibrators, blocking oscillators, sweep circuits are studied. Trouble shooting techniques are emphasized.

41. **ELECTRONIC CONTROL CIRCUITS.** Class 2, Lab. 4.

Rotating electrical machinery and control circuits, servomechanism components such as error detectors, amplifiers, detectors, magnetic amplifiers are considered. Specialized electronic control circuits are discussed.

51. **ELECTRONIC INSTRUMENTATION AND SYSTEMS.** Class 2, Lab. 4, cert. units 4.

Study of electronic instruments, recorders, controllers, sensing devices, transducers used in open and closed loop systems, maintenance, trouble shooting, adjustment, and calibration.

UNDERGRADUATE LEVEL

Lower-Division Courses

100. **INTRODUCTORY ELECTRICAL ENGINEERING TECHNOLOGY.** Class 4, cr. 4. Prerequisite or corequisite: MA 151A.

Fundamentals of DC and AC electricity, magnetism, electromagnetism, wave motion, sound, and light.

101. **ELECTRICAL CIRCUITS I.** Class 3, cr. 3. Prerequisite or corequisite: MA 151A, EET 113, and GNT 176 or EET 100.

A study of DC and AC electrical circuits, Ohm's law, Kirchhoff's laws, series and parallel circuits, power, magnetic circuits, switches, relays, inductance, capacitance, alternating voltages and currents, transformers, reactance, impedance, phase relationships, resonance, and an introduction to network theorems.

103. **ELECTRONICS I: VACUUM TUBES AND TRANSISTORS.** Class 2, cr. 2. Must be preceded or accompanied by EET 101.

Introduction to electron tubes, transistors, and solid state diodes. A study of the physical structure and materials as well as operation and static characteristics of the diode, triode, tetrode, and pentode vacuum tubes. A study of semiconductor materials, diodes, and transistor static characteristics and an introduction to amplifiers. Also, orientation on university organization and industrial careers.

106. INTRODUCTION TO COMPUTER FUNDAMENTALS. Class 3, cr. 3.

Reviews direct current and alternating current concepts and vacuum tube fundamentals. Surveys vacuum tube circuits, rectifiers, simple amplifiers, and fundamental oscillators. Reviews theory of transistors, basic transistor and semiconductor circuits, rectifiers, amplifiers, and oscillators. Deals with special types of transistors and bistable and multivibrator circuits. Introduces logic in electrical circuits, binary arithmetic, Boolean algebra, and the electronic flip-flop circuit. Surveys binary counting circuit, ring circuits for timing, simple memory, analog arithmetic operations components, rheostats, synchros, and resolvers. Reviews analog to digital conversion circuits, and input and readout devices.

113. ELECTRICAL ENGINEERING TECHNOLOGY LABORATORY I. Lab. 6, cr. 2. Prerequisites and corequisites: EET 101 and EET 103.

The first of a sequence of practical laboratory courses designed to develop technical skills and techniques in circuit construction, instrument operation, testing, measuring, troubleshooting, and circuit analysis. Instruments such as ammeters, voltmeters, ohmmeters, DC bridges, and oscilloscopes are used in DC and AC circuits.

151. ELECTRICAL CIRCUITS II. Class 3, cr. 3. Prerequisite: EET 113; corequisite: MA 223A.

A continuation of EET 101. The study of inductance; capacitance; network theorems; AC circuits using phasors, rectangular and polar forms; transformers; coupled circuits; nonsinusoidal voltages; transients; and polyphase circuits.

153. ELECTRONICS II. Class 3, cr. 3. Must be preceded or accompanied by EET 151.

The application of electron tubes, transistors and other solid state devices in electronic circuits. A study of rectifiers, equivalent circuits, voltage amplifiers, tuned amplifiers, oscillators, and diode logic circuits. Introduction to AM and FM receivers and transmitters.

163. ELECTRICAL ENGINEERING TECHNOLOGY LABORATORY II. Lab. 6, cr. 2. Must be preceded or accompanied by EET 153.

The second of a sequence of practical laboratory courses designed to develop technical skills and techniques in circuit construction, testing, instrument operation, measuring, troubleshooting, and circuit analysis. Experimental work on transistor and electron tube circuits, DC and AC networks, and electromechanical devices, using ammeters, voltmeters, wattmeters, oscilloscopes, signal generators, wavemeters, frequency meters and bridges.

203. ELECTRONICS III. Class 3, cr. 3. Prerequisite: EET 163.

The study of regulated power supplies, polyphase rectifiers, filters, AM receivers and transmitters, FM receivers and transmitters, waveshaping, clippers, clampers, peakers, multivibrators, blocking oscillators, and logic circuits.

205. CIRCUIT FUNDAMENTALS. Class 2, Lab. 2, cr. 3. Prerequisite: GNT 176.

Deals with special types of transistors and bistable and multivibrator circuits. Introduces logic in electrical circuits, binary arithmetic, Boolean algebra, and the electronic flip-flop circuits. Surveys binary counting circuits, ring circuits for timing, simple memory, analog arithmetic operations components, rheostats, synchros, and resolvers. Reviews analog to digital conversion circuits and input and readout devices.

211. ELECTRIC MACHINERY. Class 3, cr. 3. Prerequisite: EET 163.

A first course in machinery including small generators and motors as related to applications in electronic and servo systems. The study of DC machines and AC single- and multi-phase synchronous and induction machines.

213. ELECTRICAL ENGINEERING TECHNOLOGY LABORATORY III. Lab. 6, cr. 2. Prerequiste or corequisite: EET 203 and EET 211.

The third of a sequence of practical laboratory courses designed to develop technical skills and techniques in circuit construction, testing, instrument operation, measuring, trouble shooting, and circuit analysis. Experimental work and measurements on power supply dircuits, filters, receivers, transmitters, electrical machines, wave-shaping circuits, sweep circuits, logic circuits, and commercial equipment and selected experiments from the student's specialty.

216. ELECTRICAL MACHINES AND CONTROLS. Class 3, cr. 3. Prerequisites: MA 151A GNT 176 or equivalent.

Lecture, recitation, and demonstration are combined to acquaint the student with the elements of electrical circuits and machines as they are applied as component parts of machine drives and controls with the requirements of the National Electrical Code and in conformity to the ratings and dimensional specifications of NEMA. Manufacturers catalogs and pamphlets are used freely as classroom aids.

250. CIRCUIT AND SYSTEMS ANALYSIS. Class 2, Lab. 2, cr. 3. Prerequisite: EET 205.

Continuation of Computer Electronics I.

253. ELECTRONICS IV. Class 3, cr. 3. Prerequisite: EET 213.

A study of the applications of the fundamental electrical and electronic circuits in various specialty areas. Includes selected topics such as oscillators, synchronizing and sweep circuits, high-voltage power supplies, wide-band amplifiers, closed-loop feedback systems, transmission lines, UHF, VHF, radar, digital circuits, medical electronics, magnetic amplifiers, and lasers.

263. ELECTRICAL ENGINEERING TECHNOLOGY LABORATORY IV. Lab. 3, cr. 1. Prerequisite or corequisite: EET 253.

Selected experiments to provide a broad technical background. Experiments are selected from specialty areas such as communications, electrical power, television, computers, medical electronics, automatic controls, and aviation electronics.

UNDERGRADUATE LEVEL

Upper-Division Courses

301. ELEMENTS OF MACHINE CONTROL. Class 3, cr. 3. Prerequisite: EET 301.

The study of AC and DC machine controls. Includes relays, protective relays, circuit breakers, controllers, and contactors.

302. ELECTROMECHANICAL CONTROL COMPONENTS. Class 3, cr. 3. Prerequisites: EET 203 and EET 211.

A study of the components in open-loop and closed-loop systems. Included are sensing devices, error detectors, potentiometers, synchros, resolvers, modulators, demodulators, amplifiers, motors, generators, and networks. An analysis course that stresses operation, time and frequency response characteristics, and proper adjustment of the components.

303. COMMUNICATIONS I. Class 3, cr. 3. Prerequisite: EET 203.

An advanced study of AM and FM modulation, receivers, transmitters, networks, filters, antennas, transmission lines, and television.

306. TELEVISION I. Class 3, cr. 3. Prerequisite: EET 213.

A study of television transmission and receiving system. Includes analysis of transmitted signal, FM, video amplifiers, power supplies, synchronization, deflection, alignment, and antennas.

307. PULSE CIRCUITS. Class 3, cr. 3. Prerequisite: EET 203.

A study of waveshaping, pulse generation, switching, logic circuits used in digital computers, sweep circuits, and synchronization.

321. GENERATION AND DISTRIBUTION OF ELECTRICAL POWER. Class 3, cr. 3. Prerequisite: EET 211.

A study of the transmission and distribution of electrical energy from the generating station to the consumer. A study of the power plant, electrical power generation, transformers, distribution and transmission, and power system loading.

351. AUTOMATED POWER REGULATING SYSTEMS. Class 3, cr. 3. Prerequisite: EET 211.

A study of systems used to control and regulate speed, torque, voltage, horsepower, frequency, etc. in heavy power equipment. Includes basic ideas of feedback loop; applications of rotating amplifiers such as Amplidyne Rototrol, and others; magnetic amplifiers; and an introduction to solid state control systems.

352. INDUSTRIAL ELECTRONIC CIRCUITS. Class 3, cr. 3. Prerequisites: EET 203 and EET 211.

The analysis of electronic circuits and devices found in manufacturing industries. Included are industrial electronic power supplies, gas tubes, controlled rectifiers, timing circuits, relays, solid state switching devices, photoelectric devices, logic circuits, counters, magnetic amplifiers, induction heaters, ultrasonic, and radiation inspection.

353. COMMUNICATIONS II. Class 3, cr. 3. Prerequisite and corequisite: EET 303 and EET 253.

A continuation of EET 303. A study of different types of modulation, VHF and UHF techniques, and radar.

354. ELECTRONIC INSTRUMENTATION. Class 3, cr. 3. Prerequisites or corequisites: MET 384 and EET 253.

A study of the electronic instruments and control systems used in the manufacturing and process industries for measurement and control of temperature, fluid flow, level, humidity, and physical dimension. Includes the analysis, operation, and calibration of sensing devices, recorders, controllers, analyzers and counters that use vacuum tube and semiconductor devices.

356. TELEVISION II. Class 3, cr. 3. Prerequisite: EET 306.

A continuation of Television I. A study of color transmitters and receivers. Principles of color vision, color combination, chromaticity, picture tubes, and receiver circiuts.

361. ELECTRICAL POWER BLUEPRINTS AND DRAFTING. Class 1, Lab. 3, cr. 2. Prerequisite: EET 211.

Various types of power system blueprints and drawings related to the normal practices of representation of bus systems, substations, transmission, distribution arrangements, etc., to familiarize the student with current practice in the reading of power blueprints and diagrams.

362. AUTOMATIC CONTROL SYSTEMS. Class 3, cr. 3. Prerequisite: EET 302.

The analysis of open- and closed-loop control systems. Includes types of control; stability and typical servomechanism operation; time and frequency response characteristics; adjustment, testing, and troubleshooting techniques.

363. FCC EXAM PREPARATION. Class 1, cr. 1. Prerequisite: consent of instructor.

Review of electrical and electronic theory and the study of rules and regulations of the Federal Communications Commission to prepare for the first- and second-class FCC license. The FCC license is required for the operation and maintenance of many types of communications, broadcast, industrial, and aviation equipment.

364. ELECTRICAL MEASUREMENTS. Class 3, cr. 3. Prerequisite or corequisite: EET 253.

An advanced study of electrical instruments used to measure electric and nonelectric quantities. Explains instrument limitations, calibration procedures, possible errors, and industrial applications. Includes the analysis of precision voltmeters, ammeters, AC and DC bridges, potentiometers, and frequency standards.

366. TRANSISTORS AND SEMICONDUCTOR DEVICES. Class 3, cr. 3. Prerequisite or corequisite: EET 151 or equivalent. Not open to students with credit in EET 153.

A study of solid state physics, solid state diodes, controlled rectifiers, transistors, characteristic curves, bias techniques, parameters, equivalent circuits, small signal amplifiers, power amplifiers, and oscillators.

371. ELECTRICAL MACHINERY LABORATORY. Class 1, Lab. 3, cr. 2. Prerequisites or corequisites: EET 321 and EET 301.

A laboratory course associated with the machinery courses to integrate the presentation and to instruct the student in the construction, testing, and operation of the equipment.

372. CONTROL LABORATORY. Class 1, Lab. 3, cr. 2. Prerequisites or corequisites: EET 352 and EET 362.

A practical laboratory course that stresses testing, circuit analysis, adjustment, calibration, instrument operation, measuring, and troubleshooting. Experimental work on typical industrial devices, circuits, and systems such as DC power supplies, timing circuits, synchros, transistor amplifiers, magnetic amplifiers, control components, and experimental servomechanisms.

373. COMMUNICATIONS LABORATORY. Class 1, Lab. 3, cr. 2. Prerequisite or corequisite: EET 353.

A practical laboratory course that stresses testing, circuit analysis, adjustment, calibration, operation, measuring, and troubleshooting. Experimental work on circuits, receivers, transmitters, networks, filters and UHF measuring equipment.

374. INSTRUMENTATION LABORATORY. Class 1, Lab. 3, cr. 2. Prerequisites or corequisites: EET 354 and EET 364.

A practical laboratory course that stresses instrument construction, precision calibration, testing, and troubleshooting. Includes experiments in the measurement, recording, and control of temperature, fluid flow, and strain. Techniques used in instrument-calibration laboratories are stressed.

376. ELECTRONIC TROUBLESHOOTING LABORATORY. Class 1, Lab. 3, cr. 2. Prerequisite: EET 213.

Experimental work in analyzing and repairing equipment. The use of test instruments to locate faulty components in AM and FM receivers, television, and industrial circuits.

381. **CONTROL OF ELECTRIC MOTORS.** Class 3, cr. 3.

A specialized study of the control of speed, acceleration, stopping, plugging, reversing, cycling, etc. of AC and DC motors in heavy industry applications.

383. **ADVANCED ELECTRICAL NETWORKS.** Class 3, cr. 3. Prerequisites or corequisites: EET 213 and MA 224A.

An advanced course in network analysis that stresses network theorems, solutions of time- and frequency-domain problems.

386. **TELEVISION LABORATORY.** Class 1 Lab. 3, cr. 2. Prerequisite or corequisite: EET 356.

A practical laboratory course that stresses circuit analysis, adjustment, testing, operation, and troubleshooting techniques. Experimental work on commercial television equipment.

433. **ELECTRONICS AND INDUSTRIAL CONTROLS.** Class 2, Lab. 3, cr. 3. (7 IED Industrial Option). Prerequisite: EET 214.

Familiarization with electronics as applied to industry. Basic theory and application of electronics to controls for industrial equipment and data processing.

499. **ELECTRICAL ENGINEERING TECHNOLOGY.** Class 0-4, Lab. 3-9, cr. 1-9. Hours and subject matter to be arranged by staff. Course may be repeated for credit up to 9 hours.

GENERAL STUDIES

136. **PHYSICS: MECHANICS AND HEAT.** Lect. 2, Rec. 2, Lab. 2, cr. 4. Prerequisite or corequisite: MA 111 and MA 112; or MA 151A.

Work, energy, power, efficiency of simple machines; equilibrium conditions for solids, liquids, and gases; straight line and rotational motion—uniform and accelerated motion. Elementary principles of heat and their technical applications.

176. **PHYSICS: ELECTRICITY, SOUND, and LIGHT.** Lect. 2, Rec. 2, Lab. 2, cr. 4. Prerequisite: GNT 136, except EET students.

Fundamental principles of electricity, wave motion, sound, and light.

220. **TECHNICAL REPORT WRITING.** Class 3, cr. 3.

Extensive application of the principles of good writing in industrial reporting, with emphasis on the techniques of presenting information graphically as well as in a clear, concise written form.

INDUSTRIAL EDUCATION

Professor Eddy in charge, Lafayette

UNDERGRADUATE LEVEL

Lower-Division Courses

IED 110. **INTRODUCTION TO INDUSTRIAL EDUCATION.** Class 1, cr. 1.

Overview of industrial education with emphasis upon its function and structure in industry and the public school.

IED 260. **PRINCIPLES AND OBJECTIVES OF INDUSTRIAL EDUCATION.** Class 3, cr. 3. Prerequisite or corequisite: IED 110.

Historical, legislative, and theoretical foundations of industrial education; objectives of the various types of schools and programs.

IED 375. **TEACHING METHODS IN OCCUPATIONAL EDUCATION.** Class 3, cr. 3. Prerequisite: ED 285 or consent of instructor.

Development of competencies in the use and appraisal of the basic methods of teaching occupational subjects. Appropriateness, advantages, and limitations and specific methods.

DUAL LEVEL—UNDERGRADUATE AND GRADUATE

IED 566. **EDUCATIONAL AND INDUSTRIAL COORDINATION.** Class 3, cr. 3. Senior standing or consent of instructor required.

Common problems of education and industry, with emphasis on the development and maintenance of close correlation between school programs of industrial vocational education and the manpower needs of industrial organizations.

IED 568. **INSTRUCTION MATERIALS FOR TRADES AND INDUSTRIES.** cr. 1-6. Prerequisites: PSY 120, and ED 285, 304, and 460, or permission of instructor. (Not more than three hours may be accepted toward an advanced degree.)

Application of governing principles to establish an effective arrangement of teaching content required for occupational courses in vocational schools and classes.

IED 572. PART-TIME AND EVENING-SCHOOL PROGRAMS IN INDUSTRIAL EDUCATION. cr. 1-3. Senior standing or consent of instructor required.

Problems faced by coordinators, supervisors, and administrators in operating part-time and evening schools, with special emphasis on public relations, teacher selection, in-service training, buildings, and equipment.

Historical development; basic principles of training; the areas of industrial training; the principles and practices of training program development and presentation; review of specific training activities and programs.

IED 576. COOPERATIVE EDUCATION PROGRAMS. Class 3, cr. 3. Senior standing or consent of instructor required.

History and development of cooperative education, underlying principles and theories, operating practices and programs, administrative and legal aspects.

IED 588. TECHNICAL PROBLEMS IN INDUSTRIAL EDUCATION. Cr. 1-6. Prerequisite: Consent of instructor.

Supervised individual problem work in a technical subject matter area.

IED 590. INDIVIDUAL RESEARCH PROBLEMS. cr. 1-6. Consent of department required.

Opportunity for students to study particular problems in any phase of industrial education or to initiate themselves into research techniques under the guidance of a member of the staff. Does not include thesis work.

INDUSTRIAL ENGINEERING TECHNOLOGY

Professor Thomas in charge, Lafayette

Professor Columbus, chairman, Calumet Section

UNDERGRADUATE LEVEL

Lower-Division Courses

104. INDUSTRIAL ORGANIZATION. Class 3, cr. 3.

A detailed survey of organizational structures; operational, financial, marketing, and accounting activities; duties of management, planning, control, personnel, safety, wages, policy, and human factors necessary for effective management.

105. INDUSTRIAL ORGANIZATION AND PRODUCTION—PART I. Class 2, cr. 2.

Survey of organizational structures; operational, financial, marketing, and accounting activities; and human factors necessary for effective management of a small business. (First half of IET 104.)

120. SYSTEMS AND PROCEDURES. Class 3, cr. 3.

An introduction to the systems concept. Surveys recognizing and defining the system's problem; the management audit and tools for systems analysis; design and control of forms, work simplification, work measurement and procedures; operations research; punched card systems; management and administration; and organization of the systems function.

204. TECHNIQUES OF MAINTAINING QUALITY. Class 2, Lab. 3, cr. 3. Prerequisite: IET 104; prerequisite or corequisite: MA 112.

An analysis of the basic principles of inspection and the study of the various techniques and types of equipment connected with inspection processes. Includes methods of using mechanical, electronic, air and light devices for checking and measuring and other related techniques to determine quality levels of acceptance.

IET 220. CRITICAL PATH ANALYSIS. Class 1, Lab. 3, cr. 2.

Detailed study of planning and control of a schedule by network techniques, including the time/cost analysis of CPM scheduling for application on construction projects job shop scheduling and related problems. Includes an introduction to PERT and the use of the computer for network analysis.

224. PRODUCTION PLANNING AND CONTROL. Class 2, Lab. 3, cr. 3.

Preproduction planning of the most economical methods, machines, operations, and materials for the manufacture of a product. The planning, scheduling routing, and detailed procedure of production control.

244. FUNDAMENTALS OF PRODUCTION COST. Class 1, Lab. 3, cr. 2.

Fundamental mechanics (rules for debit and credit) of accounting, principles of account classification, business forms and procedures, financial and operating statements, and elements of cost accounting—all from the viewpoint of industrial organization.

250. FUNDAMENTALS OF PRODUCTION COST ANALYSIS. Class 2, Lab. 3, cr. 3. Prerequisite or corequisite: IS 104, except by approval of the technology chairman.

Surveys of fundamental mechanics of accounting principles of account classifiction, financial and operating statements, and the generation of cost data according to cost accounting principles. Surveys the generation of cost data according to the principles of engineering economy. Examines applications of cost accounting data and engineering economy cost data to specific management decision areas through selected case problems.

262. MOTION STUDY AND WORK METHODS. Class 2, Lab. 3, cr. 3.

The study of the various techniques of motion study including process chairs, operation charts, multiple activity charts, micro and memo motion study, therbligs, the movie camera, along with actual practice in their use. Includes study and application of the basic principles used to develop better methods of performing work.

266. WORK MEASUREMENT AND INCENTIVES. Class 2. Lab. 3, cr. 3. Prerequisite: IET 262.

A study of the fundamentals of time study and work measurement with actual practice in their use. Includes stop watch time study, measuring work with movie camera, the establishment of allowances by both stop watch and work sampling studies, the establishment and use of predetermined time values, and the construction and use of work measurement formulae.

268. PLANT LAYOUT. Class 2, Lab. 3, cr. 3, prerequisites: EG 110, or equivalent.

Arrangement of stock, machines, layout of aisles, and use of space, and material handling for the highest efficiency of production.

272. JOB EVALUATION. Class 2, cr. 2.

A survey of the basic principles and significance of job evaluation. An analysis of current practices and techniques used in job analysis, job descriptions, and job evaluation.

280. WAGE INCENTIVES. Class 2, cr. 2.

An analysis and study of various types of wage incentive plans, their significance, adaptability, effectiveness, and equitability. A systematic appraisal of the basic objectives and currently used techniques in the administration of wage incentive programs.

296. INDUSTRIAL TECHNOLOGY CASE PROBLEMS. Class 2, cr. 2.

Application of theories developed in the several industrial technology courses to selected general case problems—to provide practice in the integration of principles.

312. MATERIALS HANDLING. Class 3, cr. 3. Prerequisite: IET 104.

A survey of materials handling elements, the unit load, packaging, bulk handling, the economics of materials handling, improving existing handling methods, justification for handling equipment, special handling techniques, and the management of the materials handling divisions in the industrial organization.

354. ATTRIBUTES OF VARIABLE SAMPLING. Class 2, cr. 2.

Sampling plans including Dodge Romig, MIL, Std. 105 and sequential, line of best fit, grouped and ungrouped linear correlation, standard error of the estimate, and significance of differences.

364. TOTAL QUALITY CONTROL. Class 3, cr. 3. Prerequisite or corequisite: IET 354.

The course is aimed at determining customer needs and wants, interpreting these into a design during production, follow-up on field performance, and feeding back quality information to further improve the quality system.

460. MOTION AND TIME STUDY. Class 2. Lab. 3, cr. 3. Prerequisite: junior standing.

Techniques of motion and time study, process charts, operation charts, multiple activity charts, micromotion study, therbligs, and stop-watch time study.

INDUSTRIAL SUPERVISION

Professor Hull in charge, Lafayette

UNDERGRADUATE LEVEL

Lower-Division Courses

100. **INDUSTRIAL SUPERVISION LECTURES.** Class 1, cr. 1.

Introduction to the Department of Industrial Supervision, and to the curricula available in it, and an overview of the supervision and personnel functions in business, industry, and government.

152. **HUMAN RELATIONS IN INDUSTRY.** Class 3, cr. 3.

Study of the bases of human relations and the organization of individual and group behavior. Special emphasis on typical industrial and business relationships in everyday situations. Examines fundamental relationships between behavior and personal and group forces.

240. **LABOR RELATIONS PROBLEMS.** Class 3, cr. 3.

Problems of workers with possible solutions as suggested by organized labor and management. Regulations concerning management, labor, the collective bargaining agreement, grievance and arbitration procedures.

262. **SUPERVISED WORK EXPERIENCE.** Cr. 3.

May be repeated to a maximum of 9.

Supervised work experience directed toward providing orientation, background and insight into industrial operations. Technical and industrial jobs, or participation in industrial training programs, are typical examples of acceptable experiences. Consent of department required.

268. **ELEMENTS OF LAW.** Class 3, cr. 3.

An introductory law course, with a brief comparison of the American federal system and the parliamentary system of government; and covering law, with emphasis on judicial review, court jurisdiction, and procedure generally and basic law in particular.

356. **PERSONNEL PROBLEMS IN INDUSTRY.** Class 2, cr. 2. Prerequisite: IS 152.

Analysis of selected case problems, with emphasis on attitudes, philosophies, and responsibilities of supervisory personnel in relationship to the worker.

362. **COOPERATIVE OCCUPATIONAL INTERNSHIP.** Cr. 3-6.

May be repeated to a maximum of 24.

Organized and supervised work experience directed toward preparation for supervisory, personnel, and related positions in industry. Planned and supervised by departmental staff in cooperation with business, industrial, labor, government, and other employing organizations and agencies. Consent of department required.

368. **LEGISLATION AFFECTING INDUSTRIAL RELATIONS.** Class 3, cr. 3.

Wage contracts and payments, workmen's compensation and insurance, injunction, strikes and boycotts, and statutes affecting labor.

374. **INDUSTRIAL SUPERVISION.** Class 3, cr. 3.

Introduction to and overview of the supervision occupation. Functions, educational and other characteristics, relationship to training, ways and means of training supervisors.

474. **CONFERENCE LEADERSHIP TRAINING.** Class 2, Lab. 2, cr. 3 or Class 1, Lab. 2, cr. 2.

Training by the conference method, making use of devices, techniques, and material necessary to the work of the conference leader.

574. **MANAGERIAL TRAINING.** Class 2, Lab. 2, cr. 3, or Class 1, Lab. 2, cr. 2. Senior standing or consent of instructor required.

Historical development; basic principles of training; the areas of industrial training; the principles and practices of training program development and presentation; review of specific training activities and programs.

577. **ORGANIZATION AND ADMINISTRATION OF INDUSTRIAL TRAINING.** cr. 2 or 3. Prerequisite: IED 574.

Organization of the training function; the relationship of the training department to other departments of the plant; the evaluation of training; administrative practices; the selection and education of training personnel; professional and nonprofessional activities of training personnel.

667. **SUPERVISED FIELD PRACTICE IN INDUSTRIAL TRAINING.** cr. 3.

MECHANICAL ENGINEERING TECHNOLOGY

Professor Thomas in charge, Lafayette
Professor Columbus, chairman, Calumet Section

PERSONAL SERVICE COURSES

15. FUNDAMENTALS OF PHYSICAL MEASUREMENTS. Class 2, Lab. 4, cert. units 4.

Principles of mechanics, mechanisms, linkage, linear motion, rotary motion, energy, temperature, pressure, fluids, flow, hydraulics, pneumatics, density, and humidity. Sensing devices, measuring devices, and measuring instruments will be stressed in the practical laboratories.

21. NON-ELECTRIC INSTRUMENTS AND SYSTEMS. Class 2, Lab. 4, cert. units 4.

Study of the construction, maintenance, trouble shooting, and calibration of instruments and devices used to measure, record, and control temperature, flow, level, pressure, humidity, density, and thickness. Pneumatic, hydraulic, and electrical systems will be stressed.

UNDERGRADUATE LEVEL

Lower-Division Courses

100. APPLIED ENGINEERING COMPUTATIONS. Lab. 3, cr. 1.

Practical application of the proper use of the slide rule, desk calculator and introduction to the electronic computer and dimensional analysis. How to draw graphs and introduction to means of their reproduction.

112. APPLIED MECHANISMS. Class 3, cr. 3.

An analysis of motions, displacements, velocities, friction wheels, instant centers, flexible connectors, cams, linkages and gears.

156. GRAPHICAL COMPUTATIONS. Lab. 6, cr. 3. Prerequisite: EG 110. Prerequisite or corequisite: MA 112.

Descriptive and analytic geometry principles applied to the solution of engineering problems, intersections and development of planes and solids; layout of objects in space; and determination of clearances between objects in space.

180. MATERIALS AND PROCESSES. Class 2, cr. 2.

Application and characteristics both physical and chemical, of the materials most commonly used in industry; the primary processes involved in producing these materials for industry.

200. POWER SYSTEMS. Class 3, cr. 3. Prerequisite: GNT 136.

A survey of steam and nuclear power plants, internal combustion engines, gas turbines, pumps, compressors, fans and blowers, refrigeration. Some theory in thermodynamics, combustion of fuels, heat transfer. Power generation and application to various fields with special mention of transportation.

204. PRODUCTION DRAWING. Class 0, Lab. 6, cr. 2. Prerequisite: EG 110; prerequisite or corequisite: MET 180.

To prepare the student to accept employment as a layout and detail draftsman, including some junior design responsibility.

211. APPLIED STRENGTH OF MATERIALS. Class 4, cr. 4. Prerequisite: MET 210. Prerequisite or corequisite: MA 243A.

Principles of applied strength of materials primarily with reference to mechanical design.

212. MECHANICS OF MATERIALS. Class 4, cr. 4. Prerequisite: GNT 136; prerequisite or corequisite: MA 112.

Forces acting on rigid bodies at rest and in motion-embracing vectors, force and moment laws of equilibrium for various force systems, centroids, center of gravity and moments of inertia, stress and strain, riveted and welded joints, torsion, shear, bending and deflection of beams, combined stresses and columns.

216. MACHINE ELEMENTS. Class 4, cr. 4, Prerequisites: MET 204 and 212.

A survey of the more important elements used in tools and machines, and their general characteristics pertaining to application, operational behavior, efficiency, economy, and standardization.

228. MACHINE DESIGN I. Class 0, Lab. 6, cr. 2. Prerequisite or corequisite: MET 216.

Practical applications in the design of machines and products utilizing mechanical, pneumatic, hydraulic and electrical operation and control.

232. DYNAMICS. Class 3, cr. 3. Prerequisite: MET 212.

Basic fundamentals of dynamics; displacement, velocities, accelerations, work energy, power, impulse, momentum, and impact.

236. **JIG AND FIXTURE DESIGN.** Class 0, Lab. 6, cr. 2. Prerequisite: MET 204.

Application of principles in the design and construction of drilling, milling, reaming and assembly jigs and fixtures; information related to materials, heat treatment and cost estimating. Gaging characteristic, selection and design for interchangeable manufacture.

256. **MATERIAL FABRICATION.** Class 2, cr. 2. Prerequisite or corequisite: MET 180.

A study of the physical characteristics of metals and non-metals with respect to their behavior during fabrication; methods of material removal; elementary aspects of machine tool operation and tooling requirements.

288. **DIE DESIGN.** Class 0, Lab. 6, cr. 2. Prerequisite: MET 204.

Application of principles in the design and construction of piercing, blanking, forming, drawing dies; single combination compound and progressive type dies. Cam and assembly dies. Related information as to materials, heat treatment, and cost estimating.

296. **MACHINE TOOL LABORATORY.** Lab. 3, cr. 1. Prerequisite or corequisite: MET 180.

Two weeks' course consisting of 48 laboratory hours of instruction offered at the Lafayette campus on a full-time basis or on the eight Saturdays during the regular summer session.

To acquaint students with the uses and limitations of general purpose and production machines as well as with integrating processes of foundry welding, heat treating, and inspection into production planning.

299. **MECHANICAL ENGINEERING TECHNOLOGY.** Class 0-4, Lab. 3-9, cr. 1-9.

Hours and subject matter to be arranged by staff. Primarily for third or fourth semester students with special aptitudes.

UNDERGRADUATE LEVEL

Upper-Division Courses

300. **APPLIED THERMODYNAMICS.** Class 3, cr. 3. Prerequisite: MA 224A.

The fundamentals of thermodynamics, including applications of the first and second laws, enthalpy, entropy, reversible and irreversible processes.

330. **INTRODUCTION TO FLUID POWER.** Class 3, cr. 3, or Class 2. Lab. 2, cr. MET 212.

Properties of hydraulic fluids, generation, transmission and utilization of hydraulic power, hydraulic and pneumatic controls and circuits.

335. **BASIC MACHINING.** Class 1, Lab. 3, cr. 2. Prerequisites: MET 180, MA 151A, EG 110, or equivalents.

A comprehensive survey of machine tools as they are used in converting workpieces into finished products with consideration of cost, quality, quantity, and interchangeability. Actual operation analysis of many machine tool setups will be provided for comparison studies.

340. **PIPING AND PLUMBING DESIGN.** Class 3, cr. 3. Prerequisite: MET 330.

Design of plumbing systems, include losses in pipes, fittings, nozzles, orifices, etc. Include steam water and oil systems. Piping handbooks and catalogues are utilized in conjunction with the State of Indiana Piping Code.

MET 350. APPLIED FLUID MECHANICS. Class 3, cr. 3. Prerequisite: MET 300.

The fundamentals of fluid mechanics, including: properties of fluid, pressure; hydrostatic force on submerged areas; kinematics and dynamics of fluid flow; friction losses and sizing of pipes.

360. **HEATING VENTILATING AND AIR CONDITIONING.** Class 3, cr. 3. or Class 2, Lab. 2, cr. 3. Prerequisite: MET 200.

A study of heat losses, heat producing equipment and cooling equipment in addition to the design of the direct systems. Includes controls and cost estimating for commercial, industrial and residential systems. Codes and standards are emphasized throughout the course.

361. **REFRIGERATION.** Class 3, cr. 3. or Class 2, Lab. 2, cr. 3. Prerequisite: MET 360.

Design and maintenance of refrigeration systems for large and small applications. This course is intended to complement MET 260 for large air conditioning systems.

380. **MATERIALS AND PROCESSES.** Class 2, cr. 2. Open only to non-M.E.T. students.

Application and characteristics, both physical and chemical, of the materials most commonly used in industry; the primary processes involved in producing these materials for industry.

384. **INSTRUMENTATION.** Class 2, Lab. 3, cr. 3.

Basic principles of instruments selected. Care and use as found in industry for physical measurement.

400. **POWER SYSTEMS.** Class 3, cr. 3. Prerequisite: GNT 136. Open only to non-M.E.T. students.

A survey of steam and nuclear power plants, internal combustion engines, gas turbines, pumps, compressors, fans and blowers, refrigeration. Some theory in thermodynamics, combustion of fuels, heat transfer. Power generation and application to various fields with special mention of transportation.

412. **MECHANICS OF MATERIALS.** Class 4, cr. 4. Prerequisite: GNT 136. Prerequisite or corequisite: MA 112. Open only to non-M.E.T. students.

Forces acting on rigid bodies at rest and in motion-embracing vectors, force and moment laws of equilibrium for various force systems, centroids, center of gravity and moments of inertia, stress and strain, riveted and welded joints, torsion, shear, bending and deflection of beams, combined stresses and columns.

426. **INTERNAL COMBUSTION ENGINES.** Class 2, Lab. 2, cr. 3.

A study of the spark ignition, compression ignition and continuous burning internal combustion engines.

497. **SENIOR PROJECT.** Class 2, Lab. 2, cr. 3.

Directed work on individual projects for senior Mechanical Engineering Technology students.

METALLURGICAL ENGINEERING TECHNOLOGY

UNDERGRADUATE LEVEL

Lower-Division Courses

184. **FERROUS METALLURGY.** Class 3, cr. 3. Prerequisite: CHM 109, GNT 136.

A study of the extraction, refining and shaping of iron and ferrous alloys.

228. **PHYSICAL METALLURGY I.** Class 3, Lab. 3, cr. 4. Prerequisite: GNT 176, CHM 212.

Basic principles of physical metallurgy, structure and solidification, mechanical and chemical properties, phase diagrams, heat treatment, diffusion and corrosion.

229. **PHYSICAL METALLURGY II.** Class 3, Lab. 3, cr. 4. Prerequisite: MTT 228.

A continuation of MTT 228.

240. **HEAT TRANSFER AND THERMODYNAMICS.** Class 2, Lab. 3, cr. 3. Prerequisite or corequisite: MA 224A.

An introduction to the laws of thermodynamics. Solutions of practical engineering problems involving transfer of heat by conduction, radiation and convection.

280. **NONFERROUS METALLURGY.** Class 2, cr. 2. Prerequisites or corequisites: CHM 109, GNT 136.

Fundamentals of production metallurgy with specific references to practices used with non-ferrous metals.

284. **METALLOGRAPHY.** Class 1, Lab. 6, cr. 3. Prerequisite: MTT 228.

Preparation and microscopic examination of metals and alloys with written reports of investigational work done. Microscopic examination of metallic fabricated articles.

290. **MECHANICAL METALLURGY.** Class 3, cr. 3. Prerequisite: MTT 228.

Mechanical and metallurgical aspects of plastic deformation, fracture, fatigue and creep.

NURSING

Professor Johnson in charge, Lafayette

Professor Ellis, chairman, Calumet Section

Practical Nursing (noncredit leading to LPN)

Professor Ramsey in charge

8. **VOCATIONAL ETHICS AND PERSONAL HYGIENE.** Class 6, cert. units 6.

Designed to give the practical nursing student an understanding of ethical and interpersonal relationships with the patient, family, physician, professional nurse, and other coworkers. Includes development of an understanding of the patient's needs by making the student nurse aware of her own physiological, psychological and community needs.

16. **FAMILY LIVING.** Class 5, Lab. 4, cert. units 7.

Deals with the basic principles for successful family life, with special emphasis on the role of the practical nurse when caring for a patient in his home. Stresses food preparation, meal planning and buying, serving of regular and special diets, budgeting, and organization of home duties in order to provide a clean and wholesome environment for the sick.

Includes normal child development and problems of the aged, with emphasis on the health needs of these two age groups, and the necessity for planned activities to give them security and enrich their lives.

24. **NURSING CARE.** Class 5, Lab. 11, cert. units 10.

Develops skills necessary to give nursing care to the subacute, convalescent, and chronically ill patient, together with an understanding of the basic principles involved. Demonstration and practice of nursing skills form a major portion of this course.

Knowledge of normal pregnancy and common illness is included, together with nursing measures required in these specific conditions.

44. **MEDICAL CLINICAL EXPERIENCE.** 8 weeks. Class 4, Lab. 36, units 11.

Practical application of acquired nursing skills in the care of the medical patient in the hospital. Classroom instruction includes specialized medical techniques which have not been covered in the preclinical period.

56. **SURGICAL CLINICAL EXPERIENCE.** 8 weeks. Class 4, Lab. 36, cert. units 11.

Practical application of acquired nursing skill in the care of the surgical patient in the hospital. Classroom instruction includes specialized surgical techniques which have not been covered in the preclinical period.

64. **MATERNITY CLINICAL EXPERIENCE.** 8 weeks. Class 4, Lab. 36, cert. units 11.

Practical application of acquired nursing skills in the care of mothers and newborn infants in the hospital. Includes two weeks' experience in the labor and delivery room. Classroom instruction includes specialized maternity and nursery techniques which were not covered in the preclinical period.

72. **PEDIATRICS AND LONG-TERM ILLNESS CLINICAL EXPERIENCE.** 8 weeks. Class 4, Lab. 36, cert. units 11.

Practical application of acquired nursing skills in the care of children and patients whose conditions require long-term hospitalization. Classroom instruction includes specialized nursing techniques, applicable to these patients, which were not covered in the preclinical period.

Nursing (Leading to RN)

110. **INTRODUCTION TO NURSING.** Class 3, Lab. 6, cr. 5.

This course presents commonalities of the fundamental processes of illness, basic concepts in nursing and fundamental skills in patient care. Content is developed through the use of problem solving method in the classroom, university and hospital laboratory, and student's oral and written communications.

120. **MATERNAL AND CHILD NURSING.** Class 3, Lab. 6, cr. 5.

The nursing concepts in maternal and child nursing are related to the emerging family group throughout the maternity cycle, childhood and adolescence. Deviations from the normal maternity cycle and diseases and conditions common in child development are included. Emphasis will be placed on the physical, social and emotional responses to health and illness. Appropriate community resources are utilized as available.

214. **MEDICAL AND SURGICAL NURSING I.** Class 4, Lab. 9, cr. 7.

The content of this course involves the individual's response to malfunction of the body processes. Emphasis is placed on the nursing problems involved in the prevention of disease and promotion of health of the adult medical and surgical patient. Content is based upon scientific principles from allied fields and includes nursing care, treatment, drug therapy, and dietary management.

215. **MEDICAL AND SURGICAL NURSING II.** Class 4, Lab. 9, cr. 7.

This course is a continuation of NT 214 and utilizes scientific principles from the allied fields. Learning opportunities are directed towards greater depths of understanding of the complex nursing care which includes treatment, dietary management and drug therapy.

230. PSYCHODYNAMIC AND PSYCHIATRIC NURSING I. Class 2, Lab. 6, cr. 4.

NT 214 and NT 230 must be taken concurrently due to correlated instruction. The content of this course presents behavior reactions of the patient to the various symptoms and limitations he experiences as a result of illness. Correlated with this is the nurse's own behavior in response to the patient's behavior and his illness.

231. PSYCHODYNAMIC AND PSYCHIATRIC NURSING II. Class 2, Lab. 6, cr. 4.

NT 215 and NT 231 must be taken concurrently due to correlated instructions. NT 231 is a continuation of NT 230, stressing the patient's behavior and the nurse's reaction. Based on knowledge previously acquired, this course enlarges upon the principles and techniques of the nurse's role in tthe multiple approaches and therapies currently used in treating patients who are mentally ill.

250. SEMINAR IN NURSING. Class 3, Lab. 0, cr. 3.

This course enables the student to identify and understand the historical basis for problems in nursing and to become aware of the nurse's responsibility toward solution of these problems. Content also includes career opportunities, professional organizations, community and world health organizations, legal and ethical implications and methods of planning and assigning nursing care.

Faculty and Staff

ADAM J. ADAMS (1968)..Associate Professor of Computer Technology
B.S., Notre Dame, 1952; M.S., Illinois Institute of Technology, 1964; P.E., Indiana.

WALTER F. C. ADE (1959)........Associate Professor of Modern Languages and Education
B.A., Queen's (Canada), 1933; M.A., Toronto (Canada), 1939; B. Paed., M.Ed., 1943; M.S.Ed., Indiana, 1955; Ph.D., Northwestern, 1949; Ed.D., Indiana, 1960.

JOSEPH E. ANDERSON (1968)......Assistant Professor of Mechanical Engineering Technology
A.A., Chicago City College, 1957; B.S., Valparaiso, 1959; M.S., DePaul, 1964.

ROBERT G. ANDERSON III (1967)........ Instructor in Sociology
A.B., Hawaii, 1956; A.M., Indiana, 1961.

ROBERT L. ANDERSON (1947)..Assistant to the Dean for Relations with Industry and Professor of Electrical Engineering Technology
B.S., Rose Polytechnic, 1942; P.E., Indiana.

EDWARD ANDREWS (1967)..........Bursar
B.A., Indiana State, 1965.

ROBERT H. BALLANCE (1968).....Assistant Professor of Economics
B.S., Tennessee, 1963.

JOSEPH R. BATTENBURG (1968).......... Chairman of the Calumet Section of the Schools of Engineering; Associate Professor of Mechanical Engineering
B.S., Andrews, 1954; B.S., Michigan, 1956; M.S., Southern California, 1960; Ph.D., Wisconsin, 1967.

ARLENE J. BAYER 1968).......Instructor in French
A.B., St. Joseph-on-the-Ohio, 1966; M.A., Purdue, 1969.

ROBERT D. BECHTEL (1966)......Associate Professor of Mathematics Education
B.S., McPherson, 1953; M.S., Kansas State, 1959; Ph.D., Purdue, 1963.

LARRY L. BECK (1966)...... Assistant for Development and Planning to the Associate Dean and Instructor in Architectural Technology
A.A.S., Purdue, 1963; B.S., 1966.

NANCY M. BECK (1967)........Instructor in Spanish
B.A., Grove City, 1963; M.A., Michigan State, 1965

ROBERT J. BOES (1967)........Instructor in Biology
B.A., State College of Iowa, 1964; M.S., Purdue, 1967.

LOREN E. BRUNNER (1964)...Chairman of the Calumet Section of the Department of Electrical Technology; Associate Professor of Electrical Engineering Technology
B.S., U.S. Coast Guard Academy, 1935; S.B., S.M., Massachusetts Institute of Technology, 1942.

LOUISE G. BUECHLEY (1967)....Assistant Professor of Nursing
B.A., Lynchburg, 1944; M.N., Yale School of Nursing. 1947. R.N.

EDGAR H. BUYCO (1968)..........Assistant Professor of Engineering
B.S., St. Tomas (Manila), 1953; Ph.D., Purdue, 1961.

ALAN H. CARLSON (1962)..........Assistant Professor of Chemistry
B.S., North Central, 1950; M.S., Nebraska, 1952.

EDWARD W. CLARK (1967)......Instructor in English
B.A., Otterbein, 1965; M.A., Purdue, 1967.

DONALD E. COCHRAN (1968).....Assistant Professor of Civil Engineering Technology
B.S., Indiana Institute of Technology, 1961; M.S., Michigan State, 1964.

CHARLES E. COLUMBUS (1965)............ Chairman of the Calumet Section of the Department of Manufacturing Technology; Associate Professor of Mechanical Engineering Technology
B.S., U. S. Coast Guard Academy, 1935; S.M., Massachusetts Institute of Technology, 1943.

RICHARD J. COMBS (1955)........Associate Dean with the rank of Professor
A.B., A.M., South Dakota, 1951.

KAREN M. COREY (1963)............Junior Professional Librarian
A.B., Purdue, 1963.

ARDATH A. COOLIDGE (1966).....Assistant Professor of Home Economics
A.B., Earlham, 1941; Ph.D., Iowa State, 1945.

LARRY M. CRAWFORD (1962-1965; 1968).. Registration Officer with the rank of Assistant Professor
B.P.E., Purdue, 1960; M.S., 1961.

GLENN E. DeGRAFF (1967).....Instructor in Mechanical Engineering Technology
B.S., Purdue, 1965; M.S., 1967.

MELVIN D. DeGRAFF (1965)........Assistant Dean for Student Services with the rank of Assistant Professor
B.S., Illinois State, 1950; M.A., DePaul, 1955.

MARTIN J. DENKHOFF (1968)...Accounting Manager
B.S., Loyola, 1960.

MAURICE E. DIXON (1964)........Assistant Professor of Speech
B.S., Ball State, 1959; M.A., Purdue, 1964.

JOAN M. DOYLE (1957)........Instructor in Practical Nursing
B.S., Purdue, 1929.

ERVIN A. DUDEK (1968)......Instructor in Architectural Technology
A.A.S., Purdue, 1967; B.S., 1968.

CARL H. ELLIOTT (1952-55; 1959)....Dean and Director of the Calumet Campus; Professor of Industrial Psychology
A.B., Indiana, 1942; M.B.A., 1947; Ph.D., Purdue, 1952.

JOYCE A. ELLIS (1966).............Interim Chairman of the Calumet Section of the Department of Nursing; Assistant Professor of Nursing
R.N., St. Margaret Hospital School of Nursing, 1957; B.S., DePaul, 1964; M.S., 1965.

E. EUGENE ENGLE (1966)....Departmental Representative for the School of Industrial Management at the Calumet Campus; Assistant Professor of Accounting
A.B., Drury, 1946; M.B.A., New York University, 1950. C.P.A., Indiana.

HARLAN D. FAYLE (1956)......Chairman of the Calumet Section of the Department of Chemistry; Professor of Chemistry
B.A., Hamline, 1931; M.S., Minnesota, 1932; Ph.D., 1963.

GILBERT R. FISCHER (1963)......Associate Professor of Philosophy
A.B., Oberlin, 1938; Mus. B., 1940; Mus. M., North Texas State, 1949; A.M., 1950; Ph.D., Chicago, 1962.

P. VINCENT FLANNERY (1947)....Associate Professor of Physics
B.S.. St. Mary's, (Canada), 1939; M.S., Fordham, 1942.

JACK E. FORBES (1964)........Professor of Mathematics
B.S., Illinois Wesleyan, 1949; M.S., Bradley, 1952; Ph.D., Purdue, 1957.

JOHN P. FRUTH (1967)..........Admissions Officer with the rank of Assistant Professor
BS., Manchester, 1950; M.A., Ball State, 1961.

RICHARD R. FRYER (1960)........Assistant Professor of Chemistry
B.S., Western Michigan, 1939; M.S., Loyola, 1967.

ROBERT E. FULLEN (1968)........Assistant Professor of Nursing
B.S., Indiana, 1955; M.S., Butler, 1956; M.S., Pennsylvania, 1967.

EDWARD C. GALLETT (1954)......Assistant Professor of Mechanical Engineering Technology
B.S., Illinois Institute of Technology, 1947; M.S., 1964.

BETTY G. GAWTHROP (1967)..... Graduate Instructor in English
B.A., Chicago, 1963; M.A., 1966.

ROGER A. GEIMER (1966).........Assistant Professor of English
B.A., St. Mary's, 1954; M.A., Marquette, 1956; Ph.D., Northwestern, 1962.

WILLARD L. GELLIS (1966)....Instructor in English
A.B., Hofstra, 1958; M.A., Maryland, 1961.

LOWELL C. GIBSON (1958)........Associate Professor of Chemistry
B.S., Illinois, 1943; M.S., Wisconsin, 1948; Ph.D., 1952.

LEE R. GOODMAN (1967)..........Assistant Professor of Speech
B.S., Indiana State, 1955; M.S., 1965.

VERNON L. GREENE (1968).....Instructor in Political Science
A.B., Texas, 1967.

KENNETH E. GRISWOLD (1967)..Associate Professor of Education
B.A., North Dakota State, 1950; M.Ed., William and Mary, 1958; Ed.D., Southern California, 1961.

MANFRED W. H. GROTE (1967)....Assistant Professor of Political Science
B.A., Kansas, 1960; M.A., 1962; Ph.D., Maryland, 1967.

PARSHOTAM D. GUPTA (1968)....Assistant Professor of Physics
M.S., Panjab, 1959; M.S., Carnegie Institute of Technology, 1963; Ph.D., Carnegie-Mellon, 1968.

SATISH K. GUPTA (1966)..........Assistant Professor of Physics
B.S., Meerut, India, 1952; M.S., Delhi, India, 1954; M.S., Agra, India, 1956; M.S., Northwestern, 1962; Ph.D., Illinois Institute of Technology, 1966.

JOHN W. HAMMANN (1967)......Assistant Professor of Electrical Engineering
B.S., Purdue, 1936; M.S., Missouri, 1948; Ph.D., Washington, 1960.

WALTER HARTMANN (1957)..... Assistant Professor of Psychology
M.A., Chicago, 1949.

ROBERT C. HAYES (1956).........Associate Professor of Physical Education for Men
B.S., Ball State, 1949; M.A., 1956.

FRANK D. HAYS (1946)............Associate Professor of Economics
Ph.B., Niagara, 1935; M.A., 1936.

HARRY B. HIGLEY (1965)......Instructor in Computer Technology
B.S., Northern Illinois, 1961; M.S., Northwestern, 1964.

CHARLES T. HILL (1968)........Purchasing and General Services Manager
B.S., Purdue, 1967.

ROLAND J. HOFFMAN (1967)..Instructor in Mechanical Engineering Technology
B.S., Purdue, 1958.

BERNARD H. HOLICKY (1963; 1966)....... Librarian with the rank of Assistant Professor
A.B., Ohio, 1959; M.S., Case Western Reserve, 1961.

ROBERT M. HORN 1936-1949; 1960)...... Chairman of the Calumet Section of the Departments of Speech and Creative Arts; Associate Professor of Speech
B.S., Northwestern, 1931; M.S., 1938.

HENRY HOSEK, Jr. (1959)..........Assistant Professor of Mathematics
B.S., Ball State, 1958; M.A., 1960.

HARRY H. HUBBARD (1962)......Assistant Director for Administration with the rank of Assistant Professor
A.B., Yale, 1949; M.A., New York, 1958.

CHARLES R. HUTTON (1956)...Chairman of the Calumet Section of the Department of Construction Technology; Professor of Architectural Technology
B. Arch., Illinois Institute of Technology, 1955; M.S. Arch., 1961.

ADDIE B. HYMES (1967)......Administrative Assistant, Upward Bound Project
B.S., Southern, 1961.

SIN-BAN JEN (1962)................Assistant Professor of Electrical Engineering Technology
B.S., National Hunan (China), 1943; M.S., Kansas State, 1955.

GREGORY J. KACHORIS (1966)...Instructor in Architectural Technology
B.A., Illinois, 1964.

SHARON D. KADASHAW (1965)...Instructor in Mathematics
A.B., Wayne State, 1961; M.A., 1963.

ALBERT L. KAYE (1967)..........Associate Professor of Metallurgical Engineering Technology
S.B., Massachusetts Institute of Technology, 1931; S.M., 1932; Sc.D., 1934.

EDWARD P. KELEHER (1966)......Assistant Professor of History
B.S., St. Louis, 1957; A.M., 1959; Ph.D., 1965.

BARBARA E. KIENBAUM (1967). Instructor in German
B.A., Michigan State, 1963; M.S., 1967.

HENRY N. KIJOWSKI (1965).......Assistant Professor of Industrial Engineering Technology
B.S., Tri-State, 1945, B.S., 1947; M.S., Kansas State, 1966.

RICHARD J. KRETZ (1967)....Instructor in English
B.A., DePaul, 1965; M.S.. Purdue, 1967.

DONALD R. KURTZ (1968)........Assistant Professor of Computer Technology
A.A.S., Lyons Township Junior College, 1959; B.S., Illinois, 1961; M.B.A., Chicago, 1967.

HOWARD I. LEE (1966)........Instructor in Electrical Engineering Technology
B.S., Purdue, 1964.

SAUL LERNER (1967)..............Assistant Professor of History
B.A., Youngstown, 1958; M.A., Kansas, 1961; Ph.D., 1963.

WILLIAM C. LORDAN (1962)......Assistant Professor of Mathematics
A.B., Wesleyan, 1954; M.S., Wisconsin, 1960.

BRIAN V. LOWELL (1966).............Data Processing Supervisor
A.A.S., Purdue, 1966.

CHARLES J. McALLISTER (1962) Assistant Professor of Architectural Technology
B.S., Illinois, 1953; M.S., Illinois Institute of Technology, 1966; Reg. Arch., Illinois.

RICHARD F. McCORMICK (1962)..Assistant Professor of Mechanical Engineering Technology
B.Ch.E., Ohio State, 1938; M.S., 1939; P.E., New York.

JOHN T. MALONE (1956).........Associate Professor of Industrial Supervision
A.B., Indiana, 1935; M.A., Northwestern, 1940.

BOYD R. MANGUS (1951; 1954; 1958)...... Coordinator of Continuing Education and Manager of the Calumet Region; Assistant Professor of Speech
A.B., Transylvania, 1940; M.S., Purdue, 1952.

JOHN MANIOTES (1963)..........Manager of the Computer Center; Associate Professor of Computer Technology
B.S., Purdue, 1957; M.S., 1958; Ph.D., 1962.

ANATOLE C. MATULIS (1963)....Chairman of the Calumet Section of the Department of Modern Languages; Associate Professor of Modern Languages
B.A., Detroit Institute of Technology, 1955; M.A., Wayne State, 1957; Ph.D., Michigan State, 1963.

BARBARA M. MEEKER (1966)....Instructor in Architectural Technology
A.B., DePauw, 1952

HENRY J. MERRY (1962)..........Associate Professor of Political Science
A.B., Michigan, 1931; LL.B., 1936; M.A., American, 1952; LL.M., Harvard, 1954; Ph.D., London, England, 1957.

CHARLES W. MILLER (1967)......Assistant Professor of Education
A.B., Ball State, 1942; M.A., 1947; Ed.D., Northwestern, 1967.

BERNARD MIREL (1963)......Instructor in Modern Languages
B.S., New York, 1951; M.A., Indiana, 1962.

GEORGE R. MITCHELL (1966)....Assistant Professor of Physics
B.S., Wisconsin, 1947; M.S., 1948; Ph.D., 1951.

PEGGY MORAN (1965)........Instructor in English
B.A., Roosevelt, 1964; M.A., DePaul, 1965.

RONALD L. MOYER (1967)....Instructor in Creative Arts
A.B., Illinois, 1966; M.A., 1967.

CATHERINE M. MURPHY (1968)...Assistant Professor of Mathematics
A.B., Regis, 1962; M.A., Catholic University of America, 1965; Ph.D., 1968.

JOHN W. MYBECK (1965).........On Leave
B.S., Purdue, 1962; M.S., 1965.

VICTOR NAMIAS (1966)............Assistant Professor of Physics
Master, Brussels, Belgium, 1954; Diploma Nuclear Engineering, 1956; M.S., Carnegie Institute of Technology, 1962; Ph.D., 1965.

ARTHUR J. NAPARSTEK (1966)...Assistant Director, Urban Development Institute
B.S., Illinois Wesleyan, 1960; M.S.W., New York, 1962.

NILS K. NELSON (1962)............Associate Professor of Chemistry
B.S., Missouri School of Mines, 1946; M.S., Illinois, 1947; Ph.D., 1949.

GARY H. NEWSOM (1965; 1966).....Business Manager
B.S., Southern Illinois, 1964.

ROBERT E. NICHOLS, Jr. (1965)..Associate Professor of English
B.S., Illinois, 1954; M.A., DePaul, 1960; Ph.D., Washington, 1965.

MICHAEL T. O'HAIR (1968)...Instructor in Electrical Engineering Technology
A.A.S., Purdue, 1964; B.S., 1967; M.S., Western Michigan, 1968.

JACK H. PACKER (1964)......Instructor in Engineering Graphics
B.S., Illinois Institute of Technology, 1946.

JAMING PAN (1960)...........Departmental Representative, Calumet Campus Section of the Department of Physics; Associate Professor of Physics
B.S.. Taiwan Normal (China), 1955; M.S., Northwestern, 1960.

SAMUEL D. PARAVONIAN (1968)..Associate Professor of Education
A.B., Wheaton, 1951; M.A., Columbia, 1952; Ph.D., Purdue, 1966.

ANDREW J. PARKER, Sr. (1964)....Assistant Professor of Industrial Education
B.S.T., I.E., Purdue, 1940; M.S., 1952.

SYLVESTER M. PATAKI (1962)....Assistant Professor of Modern Languages
High School Specialist, Szeged (Hungary), 1939; Russian Specialist, Budapest (Hungary), 1948; Ph.D., Montreal (Canada), 1960.

VICTOR J. PELLEGRINI (1968)..Instructor in Mathematics
B.S., Illinois, 1963; M.S., Northwestern. 1965.

ROBERT L. PELOQUIN (1968).....Instructor in Biological Sciences
B.S., Purdue, 1962; M.A., Stanford, 1964.

LEONARD L. PERKINS (1966). Student Affairs and Guidance Officer with the rank of Assistant Professor
B.S., Tennessee State, 1959; M.A., Ohio State, 1962.

JOHN R. PHILLIPS (1967)..........Assistant Professor of Chemistry
A.B., Dartmouth, 1957; M.A., Ph.D., Harvard, 1962.

TRAVIS J. PHILLIPS (1966)........Assistant Professor of Chemistry
B.A., Iowa State Teachers College, 1941; M.S., Iowa, 1948; Ph.D., Ohio State, 1957.

DORIS F. PIERCE (1962)...........Assistant Professor of Political Science
B.A., East Central State, Oklahoma, 1949; LL.B., Oklahoma, 1951; M.A., 1954.

JAMES W. PRINGLE (1962)........Associate Professor of History
B.A., Illinois, 1952; M.A., 1956; Ph.D., 1961.

MARGARET E. PRUGH (1967)....Instructor in Practical Nursing
A.B., G.N., Indiana, 1944.

DAVID RADEN (1967)..........Instructor in Sociology
B.A., Northwestern, 1955; M.A., Chicago, 1963.

STEVE M. RADOS (1968)...........Assistant Professor of Computer Technology
B.S., Purdue, 1955; M.S., Illinois Institute of Technology, 1962.

ESTHER F. RAMSAY (1954-55; 1965)........ Director of the Practical Nursing Training Program; Associate Professor of Practical Nursing
R.N., Chicago Mercy Hospital, 1936; Ph.B., Northwestern, 1955; M.A., Loyola, 1962.

JOSEPH C. RAPAL (1948)..........Associate Professor of Electrical Engineering Technology
B.S., Purdue, 1938; M.Ed., Loyola, 1960.

ESTELLA E. REED (1966)..........Assistant Professor of Education
A.B., Ball State, 1940; M.S., Butler, 1948; Ed.D., Indiana, 1966.

WILLIAM W. REED, Jr. (1959)....Instructor in Electrical Engineering Technology
A.A.S., Purdue, 1966.

NICHOLAS RELICK (1948).........Associate Professor of Mathematics
B.S., Illinois, 1937; M.S., Purdue, 1951.

ALAN K. ROEBUCK (1964)........Associate Professor of Chemistry
B.S., M.S., Wisconsin, 1937; Ph.D., 1947.

NORMA G. ROONEY (1966).......Instructor in English
B.A., DePaul, 1959; M.A., 1961.

C. DAVID ROSE (1965)..........Instructor in Industrial Engineering Technology
B.S., Oklahoma State, 1962.

THOMAS F. RYAN (1968)......Personnel and Payroll Manager
B.A., Michigan State, 1965.

DAVID SAMUELS (1966)...Information Officer
B.A., Pennsylvania State, 1942.

ALFRED D. SANDER (1962).........Assistant Dean for Academic Affairs; Professor of History
A.B., American, 1948; M.A., Miami, 1950; Ph.D., American, 1955.

NICK G. SCARLATIS (1967)........Assistant Professor of Architectural Technology
B.A., Illinois, 1963; M.A., 1967.

L. DAVID SCHUELKE (1968).......Graduate Instructor in Speech
B.S., Northwestern, 1961; M.A., Illinois, 1964.

NANCY P SCOTT (1967)..........Instructor in English
B.A., Grinnell, 1962; M.A., Wyoming, 1963.

ROBERT L. SELIG (1967)..........Assistant Professor of English
A.B., North Carolina, 1954; A.M., Columbia, 1958; Ph.D., 1965.

WILLIAM F. SHEAHAN (1968).....Financial Aids and Placement Officer
B.A., DePaul, 1960.

JOHN S. SHIELDS (1967)...........Assistant Professor of Physical Education for Men
B.S., Ball State, 1962; M.A., 1964.

THOMAS D. SHERRARD (1966)....Director of Urban Development Institute; Professor of Urban Studies
B.A., Reed, 1937; M.A., Chicago, 1955.

GORDON M. SHIMER (1968).......Assistant Professor of Industrial Management
B.S., New York, 1966; M.B.A., 1967.

JANE R. SHOUP (1966)............Assistant Professor of Biological Sciences
A.B., Rochester, 1962; Ph.D., Chicago, 1965.

DAVID E. SIMPSON (1967).........Assistant Professor of Creative Arts
B.S., Purdue, 1946; M.A., Columbia, 1951.

WILLIAM H. SMEAD (1967).......Graduate Instructor in Education
B.S., Ball State, 1949; M.A., Western State, 1954.

BEVERLEE A. SMITH (1966)......Instructor in English
B.A., St. Xavier, 1962; M.A., Loyola, 1964.

JAMES A. SMITH (1968)...........Assistant Professor of Mathematics
B.S., Ball State, 1959; M.A., 1960; Ph.D., Tennessee, 1968.

NIKOLA M. SORAK (1968)..........Assistant Professor of Electrical Engineering Technology
B.S., Belgrade, 1957; M.S., Illinois Institute of Technology, 1968.

SIGRID STARK (1946)..............Associate Professor of English
B.E., Wisconsin State Teachers, 1933; M. A., Northwestern, 1938.

KARL H. STEINER (1963)..........Associate Professor of Electrical Engineering Technology
Master, Technical (Austria), 1936; Engineers Diploma, Technical of Vienna (Austria), 1938; P.E., Washington, Oregon, British Columbia, Illinios.

EDWIN L. STILLMAN (1963)...Instructor in Electrical Engineering Technology
B.S., Purdue, 1958.

BARRY J. STERN (1964)..........On Leave, Assistant Professor of Electrical Engineering Technology
B.S., Massachusetts Institute of Technology, 1961; M.S., Nebraska, 1963; P.E., Indiana.

WILFRED A. STOCK (1946).........Associate Professor of Mathematics
B.S., Lewis Institute, 1935; M.A., Northwestern, 1938.

JUDITH K. STRYCZEK (1966)......Assistant Professor of Nursing
R.N., St. Mary Mercy Hospital, 1961; B.S., Indiana, 1964; M.S., 1966.

GENE R. SULLIVAN (1967)....Instructor in Architectural Technology
A.A.S., 1963; B.S., 1965; M.S., 1968, Purdue.

FRANK SUSIENKA (1956).......Instructor in Physics
Ph.B., Northland, 1951.

MICHAEL SVONAVEC (1962)........Assistant Professor of Physics
B.S., Slovakia (Czechoslovakia), 1945; M.S., DePaul, 1955.

CHARLES B. TINKHAM (1955).....Assistant Professor of English
Ph.B., Chicago, 1949; B.S., Wisconsin, 1952.

TERENCE A. TOBIN (1966)........Assistant Professor of English
B.A., O.L.S. Scholasticate, 1961; M.A., Loyola, 1964; Ph.D., 1967.

CLIFFORD TRIMBLE (1966)....Chairman of Calumet Campus Section of the Department of Education; Associate Professor of Education
AB., Eastern Kentucky State, 1955; M.S., Purdue, 1957; Ph.D., 1967.

DANIEL J. TROY (1967)...........Associate Professor of Mathematics
B.S., St. Louis, 1953; M.S., 1958; Ph.D., 1961.

NORMAN L. TRUSTY (1964)....Chairman of the Calumet Section of the Departments of History and Political Science; Associate Professor of History
A.B., William and Mary, 1956; A.M., Boston, 1957; Ph.D., 1964.

JAMES H. W. TSENG (1966)........Assistant Professor of Electrical Engineering Technology
L.L.M., Southern Methodist, 1957; B.S., Illinois Institute of Technology, 1964; M.S., 1966.

JOHN S. TUCKEY (1953)....... Chairman of the Calumet Campus Section of the Department of English; Professor of English
A.B., Notre Dame, 1944; M.A., 1949; Ph.D., 1953.

JUDITH I. UMBACH (1968)...Instruction in Physical Education for Women
B.S., Culver-Stockton, 1958.

RICHARD A. VAN ORMAN (1966)...Assistant Professor of History
B.A., Michigan State, 1958; M.A., 1960; Ph.D., Indiana, 1964.

HAROLD B. VON HORN (1965)....Assistant Professor of Computer Technology
Ph.B., Northwestern, 1955; M.S., Wisconsin, 1956.

RONALD J. WAGENBLAST (1964) .Assistant Professor of Mathematics
B.S., Illinois Institute of Technology, 1954; M.S.T., 1964.

SIGRID E. WAGNER (1968)...... Instructor in Mathematics
B.S., Kent State, 1963; M.S., 1965; M.S., Purdue, 1967.

HAI-BOH WANG (1966)....Assistant Professor of Civil Engineering
B.S., National Taiwan, 1958; M.S., Massachusetts, 1965.

M. GWENDOLYN WEBBER (1965)...Assistant Professor of Nursing
R.N., Holy Cross School of Nursing, 1954; B.S., St. Mary's, 1956; M.S., Marquette, 1961.

MARGARET A. WECHTER (1967-68; 1969) Assistant Professor of Chemistry
B.S., Mundelein, 1962; Ph.D., Iowa State, 1967.

JOYCE H. WHITAKER (1968).....Instructor in Nursing
B.S., Loyola, 1964.

ROY S. WILLIAMSON (1964)......On Leave. Instructor in Computer Technology
B.S., Purdue, 1950.

BENJAMIN C. WILLIS (1966)......Professor of Educational Administration
B.A., George Washington, 1922; M.A., Maryland, 1926; Ed.D., Columbia, 1950.

KENNETH S. WILSON (1950-53; 1954)...... Departmental Representative for the Department of Biological Sciences at the Calumet Campus, Professor of Biological Sciences
B.S., Colorado College, 1949; M.S., Wyoming, 1950; Ph.D., Purdue, 1954.

N. DOYAL YANEY (1960)..........Instructor in Chemistry
B.S., Geneva, 1948; M.S., Ohio State, 1950.

RICHARD L. YATES (1967).....Chairman of the Calumet Section of the Division of Mathematical Sciences Associate Professor of Mathematics
B.S., Florida Southern, 1952; M.A., Florida, 1954; Ph.D., 1957.

EDNA J. YORK (1968)..........Instructor in Nursing
R.N., St. Margaret, 1963; B.S., Indiana, 1968.

CLARENCE H. ZACHER (1948).....Associate Professor of Engineering Graphics
B.S., Illinois Institute of Technology, 1932; P.L.S., Indiana, P.E., Indiana and Illinois.

EILEEN C. ZACHER (1953).........Assistant Professor of Mathematics
B.S., Chicago, 1937; M.A., Loyola, 1942.

SHEA ZELLWEGER (1966).....Departmental Representative for the Department of Psychology at the Calumet Campus; Assistant Professor of Psychology
B.A., Chicago, 1952; M.A., Temple, 1957; Ph.D., 1966.

THEODORE J. ZUGEL (1967)..Administrative Assistant, Data Processing
A.A.S., Purdue, 1966.

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Purdue University Calumet Campus
2233 171st Street
Hammond, Indiana 46323